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THE

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AND OF THE

INSTITUTIONS IN UNION.

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Journal of the Society of Arts.

FRIDAY, NOVEMBER 23, 1860.

EXAMINATIONS, 1861. — NOTICE TO INSTITUTIONS AND LOCAL EDUCATIONAL BOARDS.

The attention of Secretaries of Institutions and Local Boards is specially called to Par. 5 of the Programme of Examinations for 1861, as follows:—

5. A detailed list of the chairman, secretary, and other members of each Local Board, giving not only their names but their addresses and designations, should be submitted to the Council of the Society of Arts before the 1st of January, 1861. In some cases the Local Educational Boards comprise such large districts that for the convenience of the Candidates, Branch Local Boards have to be formed within the Districts. Wherever this is the ease, the names and addresses of the members, both of the District Board and of its Branch Boards, must be forwarded to the Secretary of the Society of Arts. All changes in the composition of the various Boards now in existence, or to be formed hereafter, should be immediately notified to the Society of Arts.

INTERNATIONAL EXHIBITION OF 1862.

The following addition has been made to the List of Guarantors and of the sums guaranteed since the announcement in the *Journal* for November 2:—

*** *The name marked with an asterisk is that of a Member of the Society of Arts.*

NAMES.	AMOUNT.	REPRESENTING THE OBJECTS OF THE SOCIETY—ARTS, MANUFACTURES, AND COMMERCE.
Amount last announced	£365,800	
*R. W. Winfield and Son, Cambridge-street Works, Birmingham	1,000	Manufactures.
Total	£366,800	

By Order, P. LE NEVE FOSTER, *Secretary.*

FIRST ORDINARY MEETING.

Wednesday, November 21, 1860.

The first Ordinary Meeting of the One Hundred-and-Seventh Session was held on Wednesday, the 21st inst., Sir Thomas Phillips, F.G.S., Chairman of Council, in the chair.

The following gentlemen were proposed for election as Members of the Society:—

Adams, John ....Hamilton, N.B.
Aldam, William, ...Frickley-hall, near Doncaster.
Alexander, Henry B. ......The Laurels, Barnes, S.W.
Artingstall, George.........Warrington.
Baldry, James Danford ... 2, Queen's-square-pl., Westminster, S.W.
Barnet, George ....2, Leinster-gds, Hyde-pk., W.
Bartholomew, C.............Broxholme, Doncaster.
Begbie, Thos. Stirling......4, Mansion-house-place, E.C.
Boulton, Joseph ....28, Bagnigge-wells-road, W.C.
Bradbury, James............Huddersfield.
Bragg, John.................18, Vittoria-st., Regent-place, Birmingham, and 18, Thavies-inn, E.C.
Bramston, William.........11, Waterloo-place, S.W.
Bridgewater, John ....41, Wood-street, E.C.
Campbell, Colin Minton... 9, Albion-place, Blackfriars, S., and Hatshill, Stoke-upon-Trent.
Campbell, Hugh.............4, St.Paul's-grove, Canonbury, N.
Caplin, Madame Anne Roxcey ....58, Berner's-street, W.
Chadwick, John ....12A, Mosley-street, Manchester.
Charlton, Henry ....10, Great Charles-street, Birmingham.
Chawner, Richard Croft ...The Abnalls, Lichfield.
Churchward, J. G. ....Admiralty-house, Dover.
Clark, Cyrus ....Street, near Glastonbury.
Clarke, I. P. ....King-street, Mills, Leicester.
Clayton, Nathaniel..........Stamp End Works, Lincoln.
Clements, Robt. George...93, Church-st., Shoreditch, N.E.
Cosens, Fredk. Wm. ....16, Water-lane, Tower-st., E.C.
Coulthurst, Wm. M. ....59, Strand, W.C.
Cowie, Thos. S. ....24, George-st., Hanover-sq., W.
Cremer, Wm. H., jun....... 210, Regent-street, W., & 10, Bridge-st., Westm., S.W.
Deacon, Solomon............59, Alma-street, New North-road, Hoxton, N.
Docker, F. W..................24, Denbigh-st., Pimlico, S.W.

Elkington, Alfred .... 22, Regent-street, Waterloo-place, S.W.
Emanuel, Harry ....21, Hanover-square, W.
Ernest, Henry................4, Whitehall, S.W.
Fetherstone, John Wm....Church-street, Longford.
Gaskell, John ....St. Nicholas-at-Wade, Margate.
Grant, Alexander ....2, Clement's-ct., Wood-st., E.C.
Gruneisen, Chas. Lewis ...16, Surrey-street, Strand, W.C.
Hannington, C. S. ....North-street, Brighton
Harrison, Thos. E., C.E. 27, Great George-street, S.W..
Hartley, James ....Wear Glass Works, Sunderland
Heather, James .... The Crescent, Camden-road-villas, N.W.
Heymann, Lewis.... ....Stoney-street, Nottingham.
Holland, P. H. ....36, Camden-square, N.W.
Horn, James ....14, High-st., Whitechapel, E.
Isaacs, Saul ....6, Thurloe-sq., Brompton, S.W.
Johnston, Rev. Jno. Brown .Glasgow.
Joyce, Rev. Jas. Gerald...Strathfieldsaye, Hants.
Kelly, Sir Fitzroy, M.P....32, Dover-street, W.
Kimpton, Thomas ....6, Bath-st., Newgate-st., E.C.
King, John B. .... 4, Gloucester-road, Kensington-gate, W.
Kinns, Samuel, Ph.D. ...Highbury New-park, N.
Landon, James .... 88, Inverness-terrace, Bayswater, N.
Lawson, Charles ....Edinburgh.
Lea, Charles ....Broad-street, Worcester.
Levinsohn, Lewis ....7, Finsbury-square, E.C.
Lightly, William ....123, Fenchurch-street, E.C.
Lockwood, Benjamin ......Huddersfield.
Maclea, Charles G..........17, Blenheim-terrace, Leeds.
Maw, George ....Benthall-hall, near Broseley.
Middleton, Capt. Sir G. N. Broke, Bart., C.B. Shrubland-park, Ipswich.
Miles, W. P. ....Forest-hill, Kent, S.E.
Munn, Major W. A. ...... Throwley-house, near Faversham.
Napier, Hon. William ... 2, Old Palace-yard, Westminster, S.W.
O'Hagan, John ....81, Lombard-street, E.C.
Olding, John, C. E. ......Hull
Payne, James .... Canada-mills, Rotherhithe, S.E.
Peake, Thomas .... Brampton-lodge, near Stoke-upon-Trent; and the Tileries, Tunstall, Staffordshire.
Potter, Edmund, F.R.S....Dinting-lodge, Glossop.
Read, Reginald, M.D....... 1, Guildford-place, Russell-square, W.C.
Reid, Hugo ....London
Richardson, Thomas ...... 20, New Bridge-street, Newcastle-on-Tyne.
Rigby, George ....7, Park-lane, Piccadilly, W.
Robinson, James ....7, Park-lane, Piccadilly, W.
Rule, Rev. W. H., D.D....Aldershot.
Rutley, John Lewis ...... 5, Great Newport-street, Long Acre, W.C.
Rylands, John ....New High-street, Manchester.
Sage, Frederick ....11, Hatton-garden, E.C.
Shaw, Charles Henry......55, Charing-cross, S.W.
Sherriff, A. C. ....Shrubs-hill, Worcester.
Shuttleworth, Joseph......Stamp End Works, Lincoln.
Simon, George................123, Fenchurch-street, E.C.
Smith, George Henry ... 16, Queen's-chambers, Manchester.
Stanton, George ....Coton-hill, Shrewsbury.
Steevens, William .... Agnes-villa, Godolphin-road, New-rd, Hammersmith, W.
Storm, W. Montgomery C.E. .... New York, U.S.
Sulivan, Rt. Hon. Lawrence .... Broom-house, Fulham, S.W.
Telford, Charles ....Widmere, Bromley, Kent, S.E.
Thomas, Edwin, C.E....... 20, Wharf-street, City-road Basin, E.C.
Thompson, Harry S., M.P... Kirby-hall, York, and 7, Mansfield-street, W.
Vickers, George ....Sheffield.
Vieweg, A. J. ....82, Wood-street, E.C.
Virtue, James S. ....294, City-road, E.C.
Welch, John K. ....51, Berners-st., Oxford-st., W.
White, Bromley .... 4, Princes-street, Bank, E.C., and 15, Percy-place, Clapham-road, S.
Wilkinson, David .... 2, Park-street, Higher Ardwick, Manchester.
Willet, John, C. E., ...35, Albyn-place, Aberdeen.
Wood, John...................Thedden-grange, Alton, Hants.
Woollams, Henry .... 110, High-street, near Manchester-square, W.
Wrigley, Francis............ 16, Queen's-chambers, Manchester.
Zanzi, Alexander............30, Brompton-crescent, S.W.

The Chairman delivered the following

ADDRESS.

It has been the pleasure of the Council to elect me their Chairman a second time, a distinction which I highly value; and it shall be my aim to repay their confidence, by endeavouring with assiduity and zeal to promote the objects of the Society.

Brief as is the period since our last Session, it has been marked by the death of many members of the Society, and names, once well known in this room, will be found in the obituary of the year.

The name of Joseph Locke must now be added to those of Stephenson and Brunel, whose loss we mourned at the opening of the last session; and we have thus been deprived, in the space of little more than twelve months, of the three men to whom is largely due the marvellous extension of locomotive railways in our own, and their introduction into other countries. The son of a colliery viewer, Locke was apprenticed at an early age to George Stephenson, and owed, for the most part to self-culture, that acquaintance with the principles of his art which enabled him to design and execute several of the principal lines of railway, as well in this country as on the continent of Europe, especially in France. I shall not attempt to define the exact position which Locke occupied in the scientific world, but no difference of opinion prevails with respect to his entire mastery of the practical details of his calling, or the energy, courage, and caution by which his character was distinguished, and which contributed to obtain for him the rare reputation of being an economical engineer. One who knew him well, when asked to indicate what he regarded as the salient features of his character as an engineer, writes of him thus:—"Locke was, I think, chiefly peculiar as an engineer, all through his career, for avoiding great works. He always endeavoured to achieve his object with the smallest means. Thus, instead of tunnelling Shap Fell, in joining Scotland and England together, he decided to go over, and trust to the greater development of power in the loco-

motive engine, which has been abundantly realized." The problem involved in the selection of gradients has changed very much since the early lines of railway were laid out, by reason of the increased power which has been given to the locomotive; but the engineer has few questions more difficult of solution than when he is required to set against each other the diminished cost of constructing, and the increased cost of working, a railway with unfavourable rather than favourable gradients. Locke's death may be termed sudden, for his illness was short, and he was taken from active life before age had weakened his intellect or bodily vigour.

The grave had scarcely closed over Locke, before his friend and associate in undertakings of national interest and importance, Mr. Matthew Uzielli, was stricken by a fatal illness, which terminated his life at the age of 55. Mr. Uzielli's mercantile operations were on a large scale; he was intimately associated with important financial undertakings, and had largely contributed to the extension of the railway system on the continent of Europe, acquiring in those pursuits wealth and influence. In this place his memory will be honoured for the liberal spirit in which he promoted science and art, and especially for the services rendered by him up to the close of his life, as a Vice-President and member of the Council of this Society; and his colleagues will cherish the recollection of the modest and unobtrusive manner in which his opinions were expressed and his counsel was offered. With the exception of His Royal Highness, the President, Mr. Uzielli was the only subscriber of £10,000 to the guarantee for the proposed International Exhibition of 1862, and his was the first name inserted in the guarantee list. It will not be without interest to mention that some years ago, when the Royal Geographical Society sought to induce the Government to fit out an expedition to explore the unknown portions of North Australia, Mr. Uzielli, who was a Fellow of that Society, offered to advance £10,000 for organising the expedition, and to trust to the Government of the day for the repayment of that large advance. Such acts denote a true nobility of character, and by them the proud title of merchant prince, in other days appropriated to Italian citizens, acquires a real significance in our own age and country.

Alfred Edward Chalon, R.A., who died recently, at the age of 80, claims a distinguished place among English artists. His water-colour drawings and miniatures, which are very numerous, possess a grace, and are characterised by a lightness of treatment, which no one has surpassed, and in addition to his mastery as a water colour painter, he painted with much skill in oil, although in this class of art his works were not numerous. His feeling for colour was delicate and refined; his forms were eminently graceful; and his powers of invention and composition were of a high order. For more than a quarter of a century his rooms were frequented by the rank and fashion of that world which loves fine clothes and rich jewels; and the high gifts and rare attainments of the artist were employed to exhibit the changing fashions of the passing hour; and hence, perhaps, it came to pass that the painter outlived his popularity, while possessing powers which might have won enduring fame. Artists who bow to the supremacy of a temporary fashion may profitably study the career of Reynolds, who, regardless of the capricious demands of his patrons, remained firm in his obedience to the true laws of Art: and his portraits, so far from becoming antiquated by age, derive an increased interest from recurring years.

The works of Alfred Chalon, united to those of his brother, the late Mr. John Chalon, R.A., formed an interesting exhibition in this place in the year 1855; and many now present will call to mind one of his last exhibited works, in this year's Exhibition, from the "Rape of the Lock," a bright and clever picture, and very remarkable as the work of a man nearly eighty years of age. Chalon was esteemed in private life for many amiable qualities, and it is understood that in the course of last year he offered his collection of water colour drawings to the inhabitants of Hampstead, on condition that they should be preserved in a suitable manner for public exhibition.

Sir William Ross R.A., was born at Tain, in Scotland, in 1794, and before his death had entered upon his sixty-sixth year. Encouraged by the advice and example of his uncle, then a member of the "Society of Arts," he early laboured to earn its rewards for artistic merit. The first successful effort was remarkable for a child of 12 years of age, an elaborate chalk copy from his Uncle Smith's engraving of the "Death of Wat Tyler," after Northcote's picture in the Guildhall of London; for this, in 1807, he received from this Society the Lesser Silver Palette. In 1808 he was awarded a Silver Medal for an original drawing of the "Judgment of Solomon;" in 1809, the Large Silver Palette for an original miniature of "Venus and Cupid;" in 1810, the Silver Medal and Twenty Guineas for an original drawing of "Caractacus before Cæsar;" in 1811, the Silver Medal and Twenty Guineas for an original drawing of "Samuel presented to Eli;" in 1816, the Gold Isis Medal for an original miniature of the late President of the Society, the Duke of Norfolk, painted solely by the aid of sketches and memoranda taken on one of the occasions on which the Duke presided. In the following year our Gold Medal was awarded to him for a large water-colour drawing of the "Judgment of Brutus." Admitted at the early age of ten to the Schools of the Royal Academy, his careful studies from

the antique and living models built up in him that accuracy of delineation which has been a distinguishing merit of his works. Two Silver Medals were awarded for his academical studies.

His reputation as a miniature painter, (an art which seems destined, as some think, to be superseded by photography) is attested by the variety and extent of his works, 3,000 in number.

Thomas Hoblyn, elected in 1815, was an active member of the Society, and served the office of Vice-President. When the Society was in an almost expiring state, some years since, he came down one evening and proposed twenty new members. He was mainly instrumental in introducing and promoting the employment of cocoa-nut oil, a sample of which had been sent to the Government from Ceylon. Mr. Hoblyn brought it before the notice of the Society, and the result of his efforts has been the establishment of a trade of great importance with India. Mr. Hoblyn was the inventor and introducer of many new articles of consumption, and a zealous promoter of science, but of late years he had ceased to take any active part in the Society's affairs.

Peter Wickens Fry, a solicitor, elected in 1845, was one of the earliest photographers in this country. He established the Photographic Club, the meetings of which were long held at his own house, and thus did much to promote the advancement of that art when it was but little known. He it was who brought into notice Archer, the inventor of the collodion process, now universally adopted at home and abroad, a process which has made photography what it is. The first picture taken by that process was exhibited by Mr. Fry, in the Society's rooms, in the year 1851. It was in a measure due to his exertions that the Art had so far advanced as to enable this Society to hold, in the winter of 1852-3, the first public Exhibition of Photographs. From that Exhibition arose the Photographic Society, in the formation of which Mr. Fry took a very active part. He was, at its formation, elected on its Council, of which he continued a member till he was compelled by illness to relinguish his seat not many months previous to his death.

Henry Riley Bradbury (son of Mr. W. Bradbury, of the firm of Bradbury and Evans), was a young man of great intelligence and activity. He introduced into England the Austrian invention of "Nature-Printing," a very remarkable process, which he worked out in this country. He also did much to improve the electrotype for purposes of block and surface-printing.

The Earl of Cawdor, Lord-Lieutenant of Carmarthenshire, a Trustee of the British Museum, D.C.L. and F.R.S., whose death has just occurred at the age of 70, possessed a mind which had been carefully cultivated, and was characterised by a scrupulous accuracy. He was a liberal and judicious patron of the arts, especially of music, with the history and progress of which he was well acquainted, and he was a good judge of pictures. When a member of the House of Commons, he took an active interest in all measures of legislation affecting the Principality, and was influential in passing through the Legislature the Statute under which Wales was incorporated with the English Judicial Circuits, and justice has since been administered in that country by Judges of the Superior Courts at Westminster. He actively encouraged all measures designed for the improvement of his own neighbourhood, contributed liberally to the work of Church restoration, and promoted education with judicious liberality.

Dr. Buist, formerly the editor of the *Bombay Times*, but latterly Chief Superintendent of the Government Press at Allahabad, was an active correspondent of the Society, well versed in all that related to the Arts, Products, and Climate of India; and ready, at all times, to assist in promoting the objects of the Society, he contributed information to our *Journal* as well as papers for reading at the evening meetings. As a practical philanthropist Dr. Buist will long be remembered in Bombay; he was forward in every enterprise for educating the people, ameliorating their condition, and rescuing the guilty from persistence in crime. He was the life of the scientific and literary societies of the place, and may almost be said to have created the science of meteorology in India,

The Rev. Baden Powell, F.R.S., and Savilian Professor of Geometry at Oxford, although not a member of the Society, had acted as a member of the Board of Examiners. His general knowledge was extensive; his understanding was vigorous; his mind had been disciplined by laborious study; his habits were characterised by unwearied industry; and his eminence in physical and mathematical science is indicated by the distinguished position which he attained early, and enjoyed long, at the University of Oxford. His contributions to science were numerous and important, and he contributed largely to the reforms which have taken place at both our Universities.

Theodore Edward Cantor, M.D., of her Majesty's Indian Medical Service, is mentioned on account of the disposition of his property by a will made on the 3rd of March, 1859, whereby he appointed the Administrator-General of Fort William to be his executor, and bequeathed his property, which we are informed exceeds in value £9,000, in equal shares to the Wellington College and the Society of Arts; and declared it to be his desire that the monies so given should be applied by the Governors of the College and by the President of the Society in such manner as they shall deem most conducive to promote the

objects of the College and Society. Apart from the substantial advantage to the Society of so considerable a bequest from one who does not appear ever to have been a member, it is very gratifying to the Council to be assured that even in distant lands the proceedings of the Society awaken the interest and enlist the sympathies of their countrymen.

The International Exhibition of Works of Art and Industry, to be holden in 1862, has largely engaged the attention of the members of the Council, and occupied much of their time during and since the close of the last session.

In order that the Council should succeed in obtaining subscriptions to the guarantee fund, it was necessary to define the general conditions on which it should be contributed, and especially to name the trustees to whom the management of the undertaking should be entrusted. The Council recommended for the office of trustees, Earl Granville, K.G., Lord President of the Council; the Marquis of Chandos; Thomas Baring, Esq., M.P.; C. Wentworth Dilke, Esq.; and Thomas Fairbairn, Esq.; and this selection has received the entire approval of the many influential persons who have signified their willingness to join in the guarantee agreement. The provisions of that agreement received careful consideration from the Council, and it was resolved that no subscriber should be liable until £250,000 at least was guaranteed; that application for a site at South Kensington should be made to the Commissioners for the Exhibition of 1851; that one-third part at least of the sum expended on buildings should be employed in erections of a permanent character, to be held by the Society for decennial or other periodical Exhibitions, and when not so used, for other purposes tending to the encouragement of Arts, Manufactures, and Commerce; and that the disposal of any surplus funds should be reserved to the guarantors for the promotion of the same objects. Active measures were taken by the Council make their arrangements known to the members of the Society as well as to other influential persons connected with Arts, Manufactures, and Commerce; and the views of the Council of the importance of periodical Exhibitions, and the value attached to them by the public as a means whereby the growth of art and industry may be stimulated, and their progress ascertained and recorded, received remarkable confirmation from the prompt and liberal spirit in which the guarantee fund was subscribed by large numbers directly interested in the operations of art and industry. Although no public appeal by advertisement has been issued, and no public meeting held, the guarantee fund now amounts to £366,800, subscribed by 662 persons.

On the 8th March, 1860, the Council transmitted to the Commissioners for the Exhibition of 1851 a copy of the guarantee agreement, inviting their collective and individual support for the undertaking, and asking for the grant of a portion of the ground at South Kensington, for the purpose of holding Exhibitions, and on the 8th June, 1860, renewed their application, and urged on the Commissioners the propriety of permanently appropriating a portion of their estate for promoting Exhibitions of art and industry. On the 30th June, 1860, the Council were informed by the Commissioners that they are willing to appropriate a portion of their estate at South Kensington for the International Exhibition of 1862 rent free; to vest in the Society of Arts, at a moderate rent, the site of the permanent buildings proposed to be erected on a part of the ground, provided the sum of £50,000 be expended in their erection; and to reserve the remainder of the ground for an International Exhibition in 1872, provided £10,000 be paid to the Commissioners out of the proceeds of the Exhibition of 1862.

Various questions have been raised in the correspondence of the Council with the Trustees, but these, I am happy to say, have now received a satisfactory solution. At the suggestion of the Trustees, a letter was addressed by the Council to the Commissioners for the Exhibition of 1851, to which a favourable reply has been given, and as the Commissioners have signified their willingness to afford such support and assistance to the undertaking as is consistent with their position as a Chartered body, and with the powers conferred upon them by their Charter of Incorporation, the Council confidently expect that the Trustees will enter on their duties without delay.

His Royal Highness the Prince Consort, whose desire it has always been to assist every well-considered plan for the advancement of Art and Science in their application to industrial pursuits, has manifested his approval of the intended Exhibition, as well by subscribing £10,000 to the Guarantee Fund as by affording to the Council valuable advice and judicious recommendations for the removal of difficulties and the successful prosecution of the undertaking: and the Council esteem very highly this recognition by His Royal Highness of the important benefits which the intended Exhibition may be expected to confer on the industry of our own and other countries.

The Council have seen no reason to relinquish the conclusion to which they came—that an International Exhibition in 1862 would elicit even more valuable results than were achieved in 1851—if managed with the same spirit and intelligence as its great predecessor. The great expansion of our commerce, as evidenced by the increase in our exports and imports; the former from 71 millions, in 1850, to 130 millions in 1859, and 101 millions in the first nine months of 1860—the numerous inventions and improvements in our manufactures—the large increase in

population and wealth—the extension of the means of locomotion by the multiplication of railways at home and abroad, and the desire for travel thus engendered—the more intimate knowledge of this country by foreigners—the spread of education—the growth of liberal commercial principles—an increased knowledge of and love for Art, will each and all contribute to swell the numbers who will seek admission to the Exhibition; whilst the manifestation of the marvellous progress of the last ten years in the staple productions of this and other countries will afford the most powerful stimulus to future improvement. The Society may be congratulated on the eminent success which has attended the efforts of the Council to provide an adequate Guarantee Fund. When their intention to promote the holding an International Exhibition in 1862 was first made known to the public, their resolution was regarded by many with apprehension and distrust, but the favourable opinion of the undertaking which was early manifested by men eminent in various walks of active life, afforded satisfactory proof that the Council had interpreted aright the feelings of their countrymen. The same motives which animated manufacturers and inventors in 1851 will exist in full force in 1862. Men hitherto but little known will provoke rivalry and challenge competition, whilst men better known and established will not be left behind in the struggle for distinction.

The Council therefore not only confidently expect to witness a successful Exhibition in 1862, but by the success of that undertaking to ensure the establishment under Royal sanction of Periodical International Exhibitions of Works of Art and Industry. The foundation of such Exhibitions as a permanent institution will form an appropriate distinction of the country in which an international Exhibition was first conducted with entire success.

The Council has published and widely circulated its programme of Examinations for 1861, wherein will be found ample details for the guidance as well of Local Educational Boards as of Students desirous that their efforts for self-improvement should be tested by the Society's Examiners.

The last Annual Conference with the representatives from Institutions in Union resolved that further provision for examination in drawing is required by the Institutions, and that it would be desirable, wherever practicable, to institute examinations for women in the most important branches of domestic economy. The Council, having taken those resolutions into their consideration, have included Freehand and Mechanical Drawing and Domestic Economy in the subjects of examination for 1861: and they have added to those subjects Mining and Metallurgy.

The results of the examinations for the present year were laid before the Ninth Annual Conference of the representatives from the Institutions in Union and the Local Educational Boards, with the Council, held in the month of June, and will be found in the report to the Council from the Secretary, published in the Society's *Journal*.

It thus appears that the previous Examination of 700 candidates was conducted by 63 Local Boards; that 586 candidates underwent the final examination, of whom 478 obtained certificates, and that 821 papers were worked; that 110 certificates of the first, 234 of the second, and 312 of the third-class were awarded, and that for 165 papers, or 20 per cent. only of the whole number worked, no certificate was given; that 16 first prizes of £5 each, and 14 second prizes of £3 each were gained, and that in 8 subjects of Examination no prize was awarded; that 12 prizes of £5 each were awarded to Institutions whose candidates obtained first prizes in some of the 25 subjects of Examination; and that four prizes of £10, £8, £6, and £4 were awarded to Local Boards. Of the 586 candidates who underwent the final examination, 437 were examined in England and Wales, 136 in Scotland, and 13 in Ireland; and of the Scotch candidates there were examined at Glasgow 110 persons, who worked 138 papers, and 122 certificates were gained by 97 persons, the number of failures at that place being 13. In addition to the Certificates six prizes of £5 each, and one prize of £3 were awarded to Glasgow candidates, six prizes of £5 each to the Institutions at which the prize candidates received systematic instruction, and £18 to two of the Local Boards of that place.

It is deserving of notice that whilst Glasgow supplied 110 candidates, and Leeds 62, the whole of the Metropolitan Institutions supplied no more than 48.

There has been distributed this year in prizes £210 (being an increase of £31 over the sum awarded last year), and of the sum this year awarded £81 has been gained at Glasgow. No papers were worked on the subject of Agriculture, and only two in Navigation, whilst the departments in which no prize was awarded included the Principles of Mechanics, Practical Mechanics, Navigation, Mensuration, and Trigonometry, all of them important in some industrial calling.

Having, in a former address, expressed my own sense of the importance to the mechanic and artisan of an intelligent acquaintance with his own language, not only as a very valuable discipline of the intellect, but as the only sufficient preparation for the employment of reading as a recreation for his leisure, it is satisfactory to observe a substantial increase in the papers worked in English History and Literature, the number this year being 82, and last year 68. The reports of the Ex-

aminers in these subjects indicate not only a greater number of papers, but also papers of a superior character to those of preceding years; but students should give good heed to the remarks of the Examiners printed in the *Journal*, and remember that, to manifest an accurate grasp of one subject is more valuable in an examination than to return crude and imperfect answers to many questions.

Whether I contemplate the number of candidates who presented themselves for examination, and especially in the class of artisans or mechanics, the number and character of papers worked in some important subjects of examination, or the number of places or centres at which Local Boards have been established and Examinations conducted, the results seem as yet scarcely commensurate with the importance of the undertaking. Four years have elapsed since the Society instituted Examinations for certificates and prizes in various departments of science, language, and literature, and this is the third year in which Examinations have taken place by means of Local Boards. The number of such Boards was forty in 1858; fifty-four in 1859; and sixty-three in 1860. The number of students at the final examination was, in 1858, 288, by whom 516 papers were worked, and to whom 361 certificates were awarded; in 1859, 480, by whom 766 papers were worked, and to whom 540 certificates were awarded; in 1860, 586, by whom 821 papers were worked, and to whom 656 certificates were awarded. Those figures indicate a gradual and steady advance in the numbers of the candidates, whilst the reports of the examiners disclose an improvement in the character of the papers worked in some departments of the examination. It must, however, be remembered that the Council has for several years been employed in encouraging the efforts for self-improvement of the adult student, in stimulating the zeal of the friends of elementary education, and in diffusing amongst all classes a due estimate of the importance of the object for which the Society has heartily laboured. The means it employs is examination, but the end sought is the intelligent education of the people who are engaged in manual labour, or, in other words, the extension of our Arts, Manufactures, and Commerce, by refining the taste and advancing the skill of our workmen. That is truly a design specially appropriate to the constitution of this Society, and one on which every recurring year confers increased importance. A large and increasing portion of the population of these islands lives by Arts, Manufactures, and Commerce, and is dependent on the skill and intelligence with which science in its various forms is applied to the arts of production. The vast amount of our manufactures which is exported to other countries competes there, not alone with the domestic produce of those countries—guarded, it may be, by jealous tariffs—but also with the fabrics there imported, whilst at home our productions enjoy no artificial protection, and can only maintain their superiority by the increased skill and advanced intelligence of the native workman. It is, when contrasting the great necessities of our times and country with the narrow limits of the work we have accomplished, that I speak with humility of the results we have achieved.

The composition and organisation of Local Educational Boards are subjects which the Council has regarded with solicitude; impressed, as they are, with the important influence which such Boards may exercise when judiciously constituted, and especially when they comprise a full representation of the educational agencies, municipal authorities, and active intelligence of their respective neighbourhoods.

Whether one locality should contain more than one Board, or whether several Boards in the same locality should be merged into one, and whether Boards for conducting the Examinations in connexion with the Society should also superintend the Middle Class Examinations, are questions which can only be duly determined by regarding the special circumstances of the particular districts. The unnecessary multiplication of Boards is doubtless an inconvenience, and may be sometimes hurtful, but the union of Boards would be a misfortune if, by undertaking the University Examinations, as well as those of the Society, suspicion should be raised in the artisan that the objects and interests of his class were overlooked or postponed to those of a class above him in the social scale.

By the agency of Institutions in Union with the Society, now 300 in number, the adult learner is supplied with books and teachers, or is encouraged and aided in the arduous task of self-culture, and obtains that guidance without which the aims and endeavours of the self-taught student so often fall short of the success they deserve. On the efficiency with which those Institutions are conducted, on the extent to which—and the efficiency with which—systematic instruction in classes is there supplied, on the self-denying spirit of the teachers, and the industry and perseverence and resolution of the students, will depend, in a large measure, the formation of those habits of thought, and the acquisition of that information, which it is the aim and design of our Examinations to elicit, make known, and reward.

It has been often confessed that those Institutions have disappointed the sanguine expectations of their early founders, and many suggestions have been offered for increasing their efficiency as agencies for adult teaching, and at the last Conference of the Representatives with the

Council, a resolution was unanimously passed, that wherever large district Educational Boards, or Local Unions of Institutions can be established, it is desirable that organising masters should be appointed to promote the establishment of adult classes, and to assist in the work of teaching. The experiment of appointing such a master has been successfully tried in East Lancashire, where a Union of Institutions and night schools was formed by the exertions of Sir James Kay Shuttleworth, and an officer of the same class has been since appointed for a Union of Institutions in South Staffordshire. In the report of your Secretary, read at the last Conference, it was intimated, as a conclusion formed by him from the tone and character of their correspondence, that the Institutions in Union are gradually becoming more educational, and in the same proportion have become entitled to, and are receiving, an increased amount of sympathy and support.

The representatives of Institutions in Union at their last Conference with the Council, resolved that it would, in their opinion, conduce to the advantage of large classes of the people if the National Museums and Public Galleries were open of an evening. The Council have already manifested their desire to promote the admission of working men to national museums and galleries after the close of their day's labour, and they retain the conviction that, by multiplying the opportunities for cultivating the intelligence, and elevating the pursuits of the people, we may look for the correction of evil habits, the diffusion of good manners, the formation of right principles, and an increased reverence for salutary authority.

The establishment of museums which should exhibit the botanical, mineral, and other natural productions, and illustrate the antiquities and industrial operations of their respective neighbourhoods, was recommended to the Institutions in Union by the representatives of those bodies at the last Conference; and the Council would welcome the efforts of the Institutions to establish such museums, in the conviction that they would promote habits of accurate observation on subjects connected with natural history, afford important aid to the intelligent study of natural science, preserve interesting remains of past ages, exhibit suitable specimens of the industry of our own, and render the Institutions objects of additional interest in their several neighbourhoods.

The formation of libraries accessible to working-men, either free or on the payment of moderate contributions, is an object which the Council would gladly promote; and they desire to express to their former colleague, Mr. William Brown, who has conferred so many benefits on the town in which his active life has been passed, their admiration of the munificence and public spirit which he has manifested, in erecting, at his own cost, a noble building, to be for ever dedicated as a museum and free library for the use of the inhabitants of Liverpool.

The Council learns with satisfaction that efforts are making to establish museums at the North, South, and East ends of London, and they hope to witness the formation of a free library in the City.

Mr. Twining has now provided a temporary building at Twickenham for the reception of his Economic Museum, which has been re-arranged, and may be viewed with tickets, which can be obtained of the Society's Secretary.

The Committee appointed to consider and report upon the Musical Pitch which it would be desirable to adopt as the standard for this country made a report which was approved of at a meeting, attended by many eminent musicians, in the month of June last, who agreed to recommend for general adoption a pitch of 528 vibrations for C. This number of vibrations marks an intermediate tone between the high opera pitch at present in use, and that recommended as a basis in mathematical treatises, and differs so slightly from that which has been fixed as the *diapason normal* in France, as to occasion no practical inconvenience, whilst it is the pitch which was adopted by the Stuttgard Congress in 1834. There is not, however, in this country any authority, as in France, for enforcing the employment of a standard pitch, and the recommendation of the Committee must rely on its own intrinsic merits for adoption. The Council, with the view of securing a general concurrence in the recommendation of the Committee, have obtained the assent of composers, performers, musical instrument makers, and patrons of music, to a declaration that they will adopt the pitch which has been selected, and promote its general employment. They have also caused a standard tuning-fork to be prepared, verified copies of which may now be obtained, and they confidently anticipate the acceptance of this pitch by the musical profession, and its ultimate adoption generally in this country.

In the session of 1857-8 a Committee was appointed by the Council to inquire into the subject of copyright in works of the Fine Arts. That Committee appointed Sir Charles Eastlake (President of the Royal Academy) their Chairman; and having held several meetings, which were numerously attended, and received answers from very many artists to whom inquiries were sent by the Committee, affording ample evidence of the wrongful and fraudulent acts extensively committed with impunity, to the injury of artists and purchasers of works of Art, reported that the existing laws of British Artistic Copyright are exceedingly defective and unjust, because they afford the producers of works of Art no sufficient protection against the piracy of their productions, and the purchasers no redress for any

invasion of their property. That by reason of this defective state of the law,—direct encouragement is given to an extensive manufacture of spurious works of Art which are sold as originals,—to the serious injury of artists, the pecuniary loss of purchasers, and the demoralization of young or needy artists employed in the preparation of such works; and injustice is inflicted upon the subjects of those foreign States who have entered into International Copyright Conventions with her Majesty, and whose works are not protected from piracy in British territories, whilst protection is afforded in such foreign States to the works of British artists.

The report of the Committee, which was framed with much care, and is characterised by much ability, and to which was appended a report from Mr. Roberton Blaine to the Committee, on the existing common and statute law relating to Artistic Copyright, will be found in the Society's *Journal* for March 26, 1859.

A Bill to establish Artistic Copyright was prepared under the direction of the Committee, and received the sanction of the Council, and by the advice of the Right Hon. S. H. Walpole, who had, at the request of the Committee, considered the provisions of the Bill, a deputation consisting of Members of Parliament, Artists, and Members of Council, waited on Lord Palmerston, on the 28th April last, when the measure was explained to his Lordship by Sir Chas. Eastlake and Mr. Field; and the Chairman of the Council informed the noble Lord that the Council, in conjunction with a Committee, represented by the deputation, had considered the subject of Artistic Copyright very carefully in all its bearings, and had drawn up the Bill to which they asked his Lordship's attention. The Bill had been carefully prepared, had been revised by Mr. Rolt, the eminent Chancery Barrister, had met with the general approval of Mr. Walpole and Sir Hugh Cairns, and had been considered by Mr. Coulson, Q.C. The deputation were desirous that the provisions of the Bill should be thoroughly investigated, and they ventured to urge upon the Government (if the principle of the measure met their approbation) to assist the Council in getting it so advanced in the House of Commons that it might be fully considered during the Session, which could only be done by their aid.

The basis adopted in framing the Bill is to secure for the artist during his life, and for a definite period after his death, a copyright in such works of fine art as he shall have designed and executed, whether pictures, sculptures, architectural designs, engravings, or photographs; to enable the artist to transfer such copyright with the original work to a purchaser, or to reserve such copyright, notwithstanding the sale of the original work: and to afford protection from the frauds practised on the public by the manufacture and sale of spurious copies, pretending to be original paintings, whether of the old masters or others.

Lord Palmerston promised to consider the Bill carefully and consult with his colleagues on the subject, remarking that if a man expressed an idea in black marks with a pen and ink upon paper, the law gave him a copyright, but if he expressed the same idea in colours upon canvass he had no copyright.

The state of public business seems to have prevented the noble Lord from giving any especial attention to the subject during the last session, but the Council have printed and circulated amongst members of the legislature and other persons of influence, a memorandum, embodying the provisions of the Bill, with reasons in its favour; and it will be their endeavour to introduce, and, as they hope, to pass through the legislature in the coming session, an Act to establish Artistic Copyright on a satisfactory basis.

In any survey of the arts and industry of this country, our mineral riches may justly occupy a prominent place. The abundance of our coal-fields, and the economy with which they can be worked, the extent of our iron-mines, and the gigantic character of the establishments at which the ore is smelted and the metal manufactured—our mines of tin, and copper, and lead—the clays from which our earthenware and porcelain are composed—the materials of which our buildings are constructed, must, in the aggregate, be regarded as sources of national wealth second only in importance to the fruits of the earth. The produce of our mines is not only adequate to the abundant and economical supply of our wants at home, but, with the exception of textile fabrics, it constitutes the most important department of our export trade, as will be seen from the following details, taken from the Board of Trade returns for the year 1857, being the largest amount exported in any year:—

Brass and copper manufactures	£3,124,049
Coals, coke, and culm	3,210,661
Earthenware and porcelain	1,492,236
Hardware and cutlery	4,016,230
Iron and steel	13,603,337
Machinery	3,883,669
Tin-plates, and tin and pewter ware	1,533,055
	£30,863,237

It is not alone the extent and variety of our mining operations or the gigantic scale of the establishments at which the ores are smelted and the metals refined and applied to their various uses, nor even the amount of capital embarked and labour employed in those undertakings, which have rendered the progress of mining and metallurgy an object of special interest to a Society which regards the application of science to the arts of production and the operations of industry as its own peculiar province.

In the operations of mining and metallurgy

the skill and experience of the intelligent artisan and mechanic have been largely guided by the researches of science; and I might instance many papers of great value read before this Society which have contributed to the formation of accurate opinions on questions of much interest in practical metallurgy. An acquaintance with mineralogy, chemistry, and mechanics is necessary for the successful practice of metallurgy, and at our mines and smelting furnaces will be found men conversant with the practical application of each of those important branches of science. The influence of this union of science with practice has been most remarkable in the making of iron and in the growth and present condition of that trade. It is well known that Surrey, Kent, and Sussex were long the chief seats of our iron manufactures, but in the reign of Elizabeth the erection of new works was prohibited in those counties by legislation, "in order that the great plenty of timber which had formerly grown there, but was then greatly decayed and spoiled, might not be utterly consumed and wasted." When John Evelyn, 50 years after the death of Elizabeth, delivered before the Royal Society a discourse on forest trees, afterwards printed under the name of Sylva, he lamented that nature had thought fit to produce this wasting ore of iron, more plentifully in wood lands than elsewhere, and thus enrich forests to their own destruction.

In the year 1619, Dudley Dudley, then a youth of 20 years old, was fetched home from Baliol College, Oxford, to manage three iron works of his father's, in Worcestershire; but wood and charcoal growing very scanty, and pit coals abounding, he was induced to alter his furnaces and attempt the making of iron with pit coal, in which he obtained such success, that at two trials he found the quality to be good and profitable, and a patent for the invention was granted by King James I., in the nineteenth year of his reign, for the term of thirty-one years. Rival manufacturers sought to deprive Dudley of the benefit of the invention, by maintaining that the patent amounted to a monopoly, but through the influence of Edward Lord Dudley, a clause was inserted in the statute against monopolies, passed in the twenty-first year of that King, saving to Lord Dudley, for 14 years, the benefits of the patent for smelting and refining iron, and all mines and metals, by means of pit-coal, sea-coal, peat and turf.

To those who regard with sympathy and reverence the struggles of ingenious and energetic men to overcome the hindrances by which inventive genius is so often obstructed, the "Metallum Martis" of Dudley Dudley, published in 1665, and dedicated to King Charles II., will well reward the trouble of a careful perusal. The overthrow of his works by a great flood; the opposition of rivals who disparaged his inventions because, as he averred, he sold good iron cheaper than they could afford it; harassing attempts to induce the legislature to annul the patent as a monopoly; the destruction of his works by riotous persons; his own imprisonment on occasion of law-suits and losses; rival patentees, who wrongfully laid claim to Dudley's invention; the seizure and sale of his estate during the civil wars for his loyalty to the King; the refusal of the Privy Council to renew the patent after the Restoration—these successive misfortunes compelled Dudley to desist from the prosecution of his inventions, although he asserted that he had accomplished an eminent triplicity in making iron—first, more sufficient; secondly, more cheap; thirdly, more excellent.

Experiments in the use of pit coal were resumed at Coalbrookdale in the early part of the last century, but the chief portion of our iron was smelted and manufactured by means of charcoal to within a century of this time. Yet, it is probable that we now consume 15 millions of tons of coal in the various operations connected with the manufacture of iron.

Two centuries ago Dudley Dudley wrote that Scotland and Wales had their supply of iron from England's granary, yet did they abound with coal, iron, stone, and mines of all sorts, and might not only supply themselves, but also his Majesty's other territories with iron, iron-wares, and steel, and thereby be helpful, not only to themselves, but to England also, and all plantations of his Majesty on this side and beyond the line.

More than a century elapsed after Dudley wrote before the Welsh Iron Trade acquired prominence, and it is not until our own-day that the Scotch Iron Trade has grown into importance.

Up to so late a period as 1786 we were largely dependent on importation for a supply of that metal. Bar iron then sold in the home market at £18 a ton, whilst a duty of £6 10s. was imposed on imported iron until 1820. Yet, so marvellous has been the growth of our manufacture of iron that, in 1857, we exported more than 1,500,000 tons, of the value, including hardware and machinery, of £21,503,236, a large portion of which was taken by iron-producing countries.

In an iron age, when our roads, ships, and buildings, are constructed so largely of iron, it cannot be inappropriate to remind the members of this Society of the rapidity which has characterised the modern growth of this important branch of our national interests, or to present to them the confirmation thereby afforded to the truth that it is natural in Arts to be in perpetual agitation and growth. I have not alluded to questions which have been considered in this room, and elsewhere, connected with the produc-

tion of steel, whether cast, or puddled, or wrought, important as those are with relation to the employment of that material in the casing of ships, or the construction of cannon, but to all who are engaged in efforts for improving our manufactures, in iron or steel, we may bid God speed, satisfied of the benefits which must result from labours in which this country has so mighty an interest.

Whilst the mineral resources of our own country enable us to produce, in great perfection, the machinery by which so large a portion of our manufacturing industry is conducted, and to provide with much economy the fuel by which that machinery is kept at work, we are dependent on our own colonies and on foreign countries for the raw materials of the greater part of our textile fabrics. Thus, our chief imports of raw cotton are from the United States. We obtain raw silk from China, India, Italy, and France; flax from Russia, and other European countries; whilst we import wool from Australia, India, the Cape, Continental Europe, and South America. The enormous extension of our cotton manufactures, and the consequent increase in the importation of raw cotton, from 150 millions of pounds in 1820, to 1,225 millions in 1859, and the large proportion of that supply which we derive from the United States, and which, in the last year, amounted to four-fifths of the whole, have naturally led our manufacturers to desire that other sources of supply of cotton should be made available for our wants. It is impossible to exaggerate the importance of this question. Millions of hands are now engaged in or dependent on our cotton manufactures, and to them a stoppage in the supply of raw cotton would be equivalent to a food famine. The same effects, although in a less degree, would be caused by a stoppage of our supplies of wool, silk, flax, or hemp, and hence the importance of rendering our supply of the raw materials of our textile fabrics less dependent on the industrial arrangements or foreign policy of particular countries than is at present the case.

In seeking such a supply, our attention is at once directed to our own colonies and dependencies, situated in every quarter of the globe, placed under almost every parallel of latitude, characterised by great diversity of climate, producing all the raw materials required for our manufactures, and offering markets for the produce of our looms and mines, and whatever else may be contributed by our arts and industry.

The Council, some years ago, through the agency of the Colonial office, made known to the Governors of our several colonies, the desire of the Society to give publicity to their resources, as well as their wants, and thus increase the demand for their productions; and they suggested, as the best means for effecting those objects, that some person or society, in each colony, qualified for the task, should frame a statement of the matters on which information would be valuable, in the form of a paper, to be read before the Society, and should suggest such further proceedings as may be most suitable to the circumstances of the colony. Amongst the Institutions in Union with the Society are several established in our Colonies, and it has been the anxious desire of the Council, by their agency as well as by the good offices of influential and intelligent persons, resident in or connected with the Colonies, to acquire and diffuse accurate information with respect to the wants, resources, arts, and products, of those important territories which own the sway of Queen Victoria, and to make known to the surplus population of an old country, where and how they may become the prosperous founders of orderly, intelligent, and industrious communities by whom the arts, the language, the domestic habits, as well as the faith and worship of their fatherland shall be preserved and extended. Although it has not as yet been found practicable to enlist much Colonial sympathy in the plans of the Council, they have succeeded in directing attention to Colonial subjects by means of Reports of much interest on Australia and New Zealand, and of papers of a valuable character, read at the weekly meetings of the Society, amongst which special mention may be made of a paper "On British Honduras; its History, Trade, and Natural Resources," read by the Hon. R. Temple, Chief Justice of that Colony, in the session of 1856-7; a paper "On Canada; its Productions and Resources," read by Professor John Wilson, F.R.S.E., in the session 1857-8, which contains valuable information on the history, physical formation, climate, productions, and social condition of that great province; a paper read in the session of 1858-9, by Mr. Hawes, a Member of Council, "On the Cape Colony," which he had personally visited, and with the affairs of which he is very conversant. In that paper an interesting account was given of the government, institutions, and laws of the colony, its religious and educational establishments; its climate, productions, and trade; its aboriginal inhabitants, and the advantages it offers to emigrants. Two papers were read by Dr. Forbes Watson, one in the session of 1858-9, "On the Growth of Cotton in India," and one in the last session "On the Chief Fibre-Yielding Plants of India," to each of which the Society's Silver Medal was awarded, and the last of which was rendered of special value by the large amount of information it contains, and by the numerous illustrations which were furnished at the expense of the Indian Government; a paper "On New Zealand and its Resources," was read by Mr. Wm. Stones, in the session 1857-8, which contained an interesting account of the climate, physical

geography, animal, vegetable, and mineral productions, political divisions, and settlement of those islands; and two papers were read by Mr. Leonard Wray, one in the Session of 1858-9, "On the Culture and Preparation of Cotton in the United States of America;" and one in the last Session, "On the Means of Increasing the Production of Sheep's Wool and of Angora Goat's Hair," to both of which the Society's Silver Medal was awarded. It is very satisfactory to the Council to find that Dr. Watson's paper on "Indian Fibres" translated into Dutch by Professor Bleekrode, one of the Society's most active corresponding members, has been published at Rotterdam; and the paper, as originally read, will be re-published in London by Messrs. Bell and Daldy.

In my last address I instanced the large importation of cotton from British India in 1857, amounting to 250 millions of pounds, or one-fourth of our entire supply for that year, not as presenting an accurate scale of the quantity actually obtained by us from that country on an average of years, but as some indication of the cotton-growing capabilities of India, and of the rapid increase which had taken place in the export of raw cotton from that country since the year 1848, when our imports from India were 84 millions of pounds, or one-ninth of our entire supply.

The tables supplied by Dr. Forbes Watson, showing the quantities and value of cotton exported from India from 1850-1 to 1857-8 inclusive, prove that my estimate of the ability of India to supply cotton in past years for one-fourth part of the consumption of this country was not exaggerated; inasmuch as it thence appears that on an average of those years, 240 millions pounds of cotton were exported in each year from India, whilst the entire imports into the United Kingdom in the same period averaged 923 millions pounds yearly; and it may be noticed that our imports of cotton, on an average of 20 years ending with 1839, did not exceed 270 millions of pounds yearly, or less than the exports of cotton from India in the year 1857.

May I not now repeat the anticipation which was then expressed, that when increased intelligence and capital shall be directed to the cultivation of the cotton plant in India, and the improved communications now in progress in that country shall be completed, our own dependency will provide us in far larger measure than at present, with a raw material of such vast importance to our manufacturing prosperity, and to the well-being of our population, thus cheapening a raw material heretofore almost exclusively supplied to Europe by the United States, and which in that country is the product of slave labour.

It is important to observe that whilst the demand for raw cotton increased from 151 millions of pounds in 1820, to 1,225 millions in 1859, the price was reduced in the same period from 11½d. to 6¼d. a pound, and the importance of that alteration will be seen when the aggregate amount of the reduction in one year is found to be 25 millions sterling.

The valuable details contained in the papers I have enumerated are unsuited to the present occasion, and I must refer those members who take an interest in the subjects to which they relate to those numbers of the *Journal* in which they are found, but in order to show the magnitude of the raw materials imported for our textile fabrics, I may state their computed value for the year 1859 :—

Cotton	£34,559,636
Wool	9,831,007
Silk	10,596,676
Flax, hemp, and jute	6,120,989
	£61,108,308

The English wool consumed in our manufactures is estimated by Mr. Wray (on what authority I know not) at 275 millions of pounds weight, the value of which may be taken at eighteen millions of pounds sterling. Of the native flax I have no estimate. The exports of our textile fabrics, according to the declared real value, amounted in the year 1859 to £78,466,248.

How strikingly is the inter-dependence of communities exemplified by the conveyance from India to England of the raw cotton grown by the ryot of Bengal, to be exchanged for the printed calico into which the same cotton is woven by the looms of Manchester, in order to be converted into garments for the peasant by whom the raw material was raised. In like manner the shepherd of Australia or the Cape is clothed in garments made from cloths woven in Yorkshire, from wools produced in those colonies, and conveyed thousands of miles from the pastures on which the sheep were fed to supply the looms of Leeds, and to be again returned as cloth to the colony in which the raw material was produced.

The formation during the present year at Manchester of a Company for promoting the growth of cotton in India, must exercise an important influence on the supply of that material if the operations of the Company are characterised by the active energy which distinguishes the leading men of that manufacturing capital.

Time will be necessary in order to form connexions with the cotton growing districts of India, and capital will be required in order to make those advances to the cultivators of cotton which our manufacturers have been accustomed to make to the flax grower of Prussia, and the bark producer of Turkey; and European agents will be necessary to manage the dealings with the native population, whose confidence must be gained by integrity and kindness; but the ad-

vantages as well to the English manufacturer as to the Indian cultivator will amply repay the men who embark in an adventure big with hope, and promising to combine the private gain of the Company with the advancement of important public interests.

The growth of our Colonial Empire, including in that term our various dependencies, has no parallel in history, whilst in extent it exceeds the territories of Rome in the second century of the Christian era, when, in the language of the historian of the "Decline and Fall," that empire comprehended the fairest part of the earth, and the most civilised portion of mankind. The relations of the various portions of our foreign possessions to the mother country; the spirit which may animate the popular assemblies to whom the Government of our colonies has been of late intrusted, and the line of demarcation which shall separate measures of Colonial Legislature from those of Imperial Government, are matters of anxious solicitude to all who duly regard the responsibilities of extended rule, and who believe that the welfare of subject races should be the end and object of those who govern.

The recent visits of the Prince of Wales to the Canadas, and of Prince Alfred to the Cape of Good Hope, the affectionate reception awarded to both the Princes in those important Colonies, and the favourable impression produced by both in the countries through which they travelled, are auguries of good promise, on which Her Majesty and His Royal Highness our President may well be congratulated. May their visits serve to bind closer the ties which unite us to those interesting provinces.

The journey of the Prince of Wales was not confined to the limits of our own colonies, but embraced a large portion of the United States; and his progress, whether there or in the Canadas, may be described as one continued triumph, enlisting sympathies, removing prejudices, and winning hearts, chiefly by the manifestation of a frank intelligence, a gentle nature, and a considerate spirit.

The Science of Meteorology in its bearing on navigation, is now daily assuming increased practical importance, and it may be interesting to the meeting to be informed that Capt. Maury, a most distinguished member of the United States Navy, is now in this country. The researches of that gentlemen in meteorology, and his investigations into the causes governing the direction and duration of storms, have led to improvements in the science of navigation of the greatest practical utility, and his perseverance and industry in obtaining accurate soundings of the Atlantic plateau, which separates England and America, preparatory to the establishment of the electric telegraph between those countries, deserve the highest praise.

The Council announce that the following papers will be read before the Society previously to Christmas:—

Nov. 28.—"On the Acclimatization of Animals." By Mr. F. T. Buckland, M.A., Student of Christ Church, Oxford, Assistant Surgeon, Second Life Guards.

Dec. 5.—"On Electro-Block Printing, especially as applied to Enlarging or Reducing from any Printing Surface or Original Drawing." By Mr. H. G. Collins.

Dec. 12.—"On Italian Commerce and Industries." By Professor Leone Levi.

Dec. 19.—"On the Straw Plait Trade." By Mr. A. J. Tansley.

The Council invite the assistance of gentlemen willing to contribute papers which they think afford materials for profitable discussion on subjects connected with Arts, Manufactures, and Commerce; and gentlemen who have neither time nor inclination to contribute papers of sufficient length or importance at the evening meetings, would confer substantial benefits on the Society by contributing, in a more condensed form, to the pages of the *Journal* the results of researches, investigations, discoveries, or practical experiments in the applied sciences.

The Council desire to direct attention to the waste products of factories, in the hope that useful information may be collected. By furnishing specimens of such waste products, with particulars of the quantities procurable, it may be found possible to employ them successfully, and to confer on them a commercial value.

The Council regret that no progress has yet been made in the erection of a building for a National Patent Office and Library, notwithstanding the large sums which have been, and are, yearly received by the Commissioners for the grants of patents.

The Society's library of patents, which is bound up to the present time, and consists of 1,233 volumes, is now accessible to our members.

The Council congratulate the Society on numerous improvements made, making, or projected in the metropolis; new streets, bridges, suburban railways, and terminal stations will change the current of traffic both for goods and passengers; subways are commenced, through which gas, water, and sewage will be conducted; subterranean railways are begun, by which traffic will be removed from our streets, and surface tramways projected, by which its passage along the streets may be facilitated; and we hope soon to behold an embankment on the north side of the Thames, which will beautify the town and purify the river. Already the atmosphere has been rendered more wholesome and pure by the partial consumption of smoke; great reforms have been effected in the supply of light and

water, and the telegraph carried over the roofs of our houses has given wings to commerce, and convenient facilities to official and domestic life. These are subjects with which our members have become conversant, either by means of papers read before the Society, or of reports from Committees or the Council.

We may indeed contemplate with some satisfaction the labours of this Society, which has now existed for more than a century. The Royal Academy of Arts has undertaken some of our original functions; the Royal Agricultural Society specially promotes agricultural science; but the Society of Arts is still the only chartered body which seeks to enlist Art as well as the applied sciences in the Promotion of Manufactures and Commerce, and bestows rewards for such productions, inventions, or improvements as tend to the employment of the poor, or the increase of trade, as well as for the application of such products, whether home or foreign, as may afford fresh objects of manufacturing industry, or extend the sphere of British commerce.

In a career so extended the Society has witnessed many vicissitudes, and has shared the fortunes, whether good or evil, of those Arts, Manufactures, and Commerce with which its lot is interwoven. There have been seasons when its light has been obscured and its labours enfeebled, but men appeared upon your Council who proved equal to the exigencies of your condition: and new paths were discovered, novel undertakings projected, and your early vigour restored.

Eleven years ago, encouraged and guided by H.R.H. your President, you originated an International Exhibition of Art and Industry, which was a great success. Eight years ago you formed the Union which now exists with Mechanics' and other Institutions for adult teaching, and 300 Institutions are affiliated to the Society.

That Union of Institutions was followed by the appointment of a Board of Examiners, and the organisation of Local Educational Boards, for the examination of persons connected with the arts and industry of the country, in subjects appropriate to their callings and conditions, a measure which, by encouraging the education of the artisan, will surely contribute to improve manufactures, and thus diffuse and extend commerce. These were undertakings worthily conceived, and not unworthily pursued.

The number of your members has doubled during the last ten, and quadrupled in the last fifteen years, and the Council has this evening had the gratification of notifying the proposal of one hundred new members. This is a larger number than has been proposed on any previous occasion, and affords satisfactory evidence that the Society enjoys the sympathy, confidence, and good opinion of the public.

In my former address from this place, I indicated the important service you would render by introducing amongst us active, ardent, and intelligent men, who are willing to labour for their country's good. To all such men we offer a hearty welcome; and whether as contributors to the weekly *Journal*, or to the papers and discussions of this place, we shall hail them as fellow-labourers for a Society which includes many agencies for promoting the welfare of the community.

But it is not alone on our members that the Council rely for help and co-operation. On our Board of Examiners, and on the Committees who, at the request of the Council, undertake important investigations, devolve duties of a laborious and weighty character, and by their assistance results are achieved which would be otherwise unattainable. May our joint labours tend to overthrow prejudices, secure improvements, diffuse science, and promote social advancement.

It was the remark of a distinguished moralist to one who lamented how small was the influence he had been enabled to exercise in a long life, that no man had lived in vain who had benefited a single human being. We often forsake the daily tasks, humble it may be in character, which are appropriate to our condition, regarding only those primal duties which shine aloft like stars, and forgetting that the charities which soothe and heal and bless are scattered at the feet of man like flowers.

Let us ever be mindful that truth, and not triumph, is the object of our discussions; and that knowledge itself must be pursued with charity, and in a loving spirit. It has been beautifully said that desire of power in excess caused angels to fall; desire of knowledge in excess caused man to fall; but in charity there is no excess,—neither angel nor man can come into danger by it.

The Chairman then presented the Medals awarded by the Council at the close of the last Session, as follows:—

To Mr. R. Thomson, for several novel and ingenious instruments, for use in dental surgery. *The Society's Silver Medal.*

To Mr. Leonard Wray, for his compound of materials as a substitute for gutta percha. *The Society's Silver Medal.*

To Mr. J. C. Morton, for his paper read before the Society, "On the Forces used in Agriculture." *The Society's Medal.*

To Mr. Leonard Wray, for his paper read before the Society, "On the Means of Increasing the Production of Sheep's Wool and Angora Goat's Hair." *The Society's Silver Medal.*

To Mr. George R. Burnell, for his two papers read before the Society, "On Building Stones—the Causes of their Decay and the Means of Preventing it," and "On Building Woods—the Causes of their Decay and the Means of Preventing it." *The Society's Silver Medal.*

To Dr. Dauglish, for his paper read before the Society,

"On a New System of Bread Manufacture." *The Society's Silver Medal.*

To Dr. J. Forbes Watson, F.R.S., for his paper read before the Society, "On the Chief Fibre-Yielding Plants of India." *The Society's Silver Medal.*

Mr. JOHN DILLON said he was quite sure that the address to which they had listened with so much pleasure, would recommend itself to them without any praise from him. Their excellent Chairman began with an obituary of those distinguished persons whom the Society—and, indeed, the country—had lost. This was a subject of special interest to him (Mr. Dillon), because one of the distinguished individuals, whose loss they all regretted, Mr. Locke, he had recently met on public business, a few days before his death, apparently in the full possession of his health, who then bade him good-bye in a tone which made him think—it he thought at all upon the subject—that his (Mr. Locke's) life was better than his own. There was, however, a consolatory subject in the Chairman's address which succeeded these announcements of death—that was the large number of those who were to be added to the list of members of the Society, and who thus evinced their interest in Arts, Manufactures, and Commerce. He was sure he spoke the sense of all who had heard it, when he said that the address of the Chairman on this occasion had been of a most comprehensive kind—that it included almost every subject important to us as men, as Englishmen, and as citizens of the world, and that he merited the warmest thanks of the Society for the labour and industry he had evinced, and for the knowledge he had imparted to the Society in that address. He (Mr. Dillon) begged therefore to propose—

"That the thanks of this meeting and of the Society be given to the Chairman for his able and comprehensive address, embracing as it does almost every subject connected with the prosperity of our own country and the well-being of mankind in general."

Mr. W. H. BODKIN (Assistant Judge) said he had great pleasure in seconding this resolution. He was sure no one could have heard that address without feeling that the Chairman had given his whole heart and soul to the subject. In one part of it he alluded to the revival of the prosperity of the Society by the introduction of a large number of new members, and by increased assiduity on the part of the old members. He believed that amongst all the members present there was hardly any one who had so strong a claim upon their respect and gratitude as the gentleman who now filled the chair. He (Mr. Bodkin) had great pleasure in seconding the vote of thanks to him for an address so full of matter, and of such singular perspicuity of language that it could not fail to carry to the hearts of all, whether members or not, the conviction that he had exerted himself to a remarkable degree to promote the interests of the Society.

The vote of thanks was then put by Mr. Dillon, and unanimously passed.

Sir THOMAS PHILLIPS in acknowledging the compliment, said it was very difficult for him adequately to express the feelings which had been produced in his mind by the very kind expressions which had been employed towards him by his excellent friends Mr. Dillon and Mr. Bodkin, but if anything could cheer a man through the labours that devolved upon him in his passage through life, it was the kind estimation formed of his services by those to whom those services were rendered. He could only say that any little service he could render them would ever be at their disposal, and he begged heartily to express to his friends around him his deep sense of their kind co-operation in the labours of the society. One word more they would permit him to say, and that was, that the proceedings of the Society, in so far as they might be attended with success, owed that success largely to the zeal and ability shown by the officers of the Society. From his association with them, now for some few years, and having occupied the chair already for more than a year, no one could know better than he did, or could express in stronger terms than he would desire to do, his sense of the services of those gentlemen.

The Secretary called attention to a new Deep-Sea Registering Thermometer, invented by Mr. Henry Johnson, and to Mr. Kerr's new Revolving Pistol; also to two Educational Instruments, invented by Mr. G. R. Smalley.*

The Secretary announced that on Wednesday evening next, the 28th inst., a paper "On the Acclimatization of Animals," by Mr. F. T Buckland, M.A., Student of Christ Church, Oxford, Assistant-Surgeon, 2nd Life Guards, would be read. On this evening Professor Owen, F.R.S., will preside.

UNIFORM MUSICAL PITCH.

The subjoined declaration is in the course of signature, and the following names have been already subscribed to it:—

The Council of the Society of Arts, desirous of remedying the inconvenience resulting to musical practice from the prevalent uncertainty of Musical Pitch, called together a meeting of musicians, musical amateurs, and musical instrument makers, in the month of June, 1859.

At this meeting, after protracted discussion, a unanimous resolution was passed, declaring that the adoption of one uniform Musical Pitch was desirable; and with a view to determine what this pitch should be, a Committee was appointed to make investigation and to report. This Committee, after careful consideration, made their report, showing the results of their investigations, and the same was laid before a general meeting, held at the rooms of the Society, on the 5th of June, 1860; and the meeting, after a full discussion—

"RESOLVED:—"That the Pitch of 528 vibrations for C be recommended for universal adoption in this country."

We, the undersigned, musicians, musical amateurs, and manufacturers of musical instruments, desire to express our full concurrence in the above resolution, and our intention, individually, to use and promote the adoption of this Pitch, so far as lies in our power:—

Giovanni Belletti, basso cantante.
William Sterndale Bennett, Mus. Prof. Cantab.
Bishop and Co., organ builders.
Henry G. Blagrove, Professor of the violin, leader, &c.
G. Bruzaud (Erard and Co.'s), pianoforte and harp maker.
Rev. W. W. Cazalet, A.M.
J. Balsir Chatterton, harpist to Her Majesty.
Thomas A. Cock, lecturer in mathematics, King's College, London.
Collard and Collard, pianoforte manufacturers.
A. De Morgan, Professor in University College, London.
Rev. G. T. Driffield, amateur, rector of Bow, Middlesex.
H. Sutherland Edwards.
George J. Elvey, Mus. Doc., Oxon; organist of St. George's, Windsor.
Lord Gerald Fitzgerald, amateur violoncellist.
Gray and Davison, organ builders.
T. M. Goodeve, M.A., Professor of Mechanics at the R.M. Academy, Woolwich.
John Goss, organist of St. Paul's Cathedral, and composer to H.M.'s Chapel Royal.
J. Henry Griesbach, professor of the pianoforte and composition.
Charles Lewis Gruneisen, F.R.G.S., musical amateur.

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* For Description, see pp. 16 and 17.

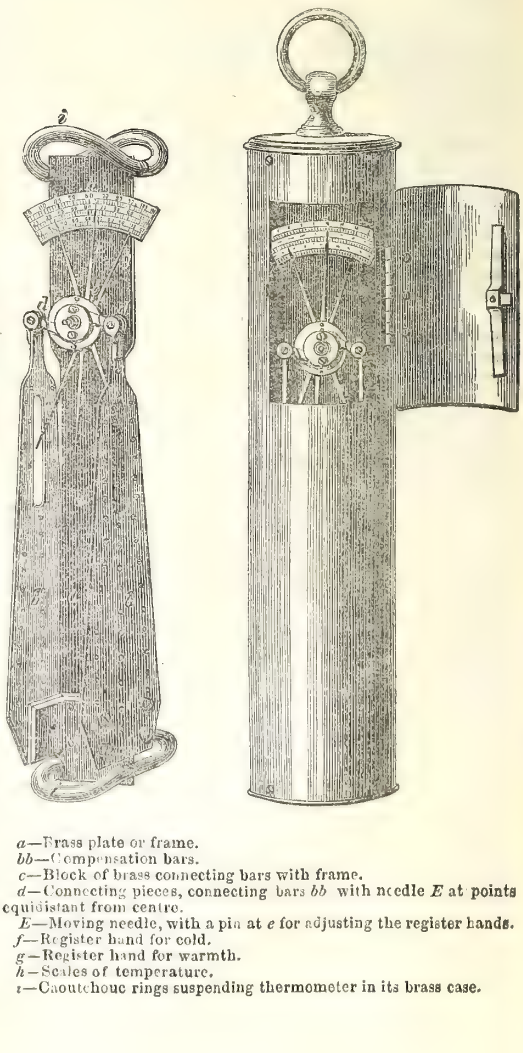
Harper, Thomas, professor at the Royal Academy of Music; principal trumpet and cornet, Royal Italian Opera, &c.
Rev. Thomas Helmore, late minor canon in Lichfield Cathedral, precentor of the National Society's Training College, Chelsea, and master of the Children of her Majesty's Chapels Royal.
William Hill and Son, organ manufacturers.
Edward John Hopkins, organist of the Temple Church, &c., &c.
James Howell, principal double bass, &c., R. Academy of Music.
John Hullah, professor of music.
Joseph Kirkman and Son, pianoforte makers.
John Köhler, musical instrument manufacturer (military).
Henry Leslie, conductor.
Henry Charles Lunn, professor at the Royal Academy of Music.
G. A. Macfarren, professor of Composition and Harmony to the Royal Academy of Music.
James Muir, pianoforte tuner.
Alfred Nicholson, principal oboe, Philharmonic Society.
Rev. Sir Frederick A. Gore Ouseley, Bart., precentor of Hereford, professor of music at the University of Oxford, M.A., and Mus. Doc.
William Pole, Mus. Bac. Oxon, Prof. University College, London.
Cipriani Potter, professor and late principal of the Royal Academy of Music.
J. Sims Reeves, vocalist.
Rev. G. Cooke Rowden, D.C.L., precentor of Chichester, and chaplain to the Royal Society of Musicians.
Sir George T. Smart, organist and composer to her Majesty's Chapel Royal.
Edwd. Taylor, professor of music in Gresham College.
James Waddell, master of the band, 1st Life Guards.
S. W. Waley, amateur.
Joseph William Walker, organ builder.
Rev. W. Whewell, D.D., master of Trinity College, Cambridge.
Rev. Professor Willis, Cambridge.
Henry Wylde, Mus. Doc., professor of harmony in the Royal Academy of Music, director and conductor of the New Philharmonic Concerts.

Tuning-forks, in accordance with the standard adopted by the Society's Committee, are manufactured and sold by Messrs. Cramer and Co., Regent-street.

DEEP-SEA THERMOMETER.

The great pressure of sea water upon thermometers of the ordinary construction in deep-sea soundings, rendering their indications untrustworthy, has led to a variety of attempts to overcome this difficulty, and Mr. Henry Johnson, whose deep-sea pressure gauge has been exhibited before the Society, has contrived a metallic thermometer,* for the purpose of getting reliable results of temperatures at great depths. The indication of temperature by this instrument is not liable to disturbance by the pressure of water; the metals by which it is composed—brass and steel—having much greater density or specific gravity than the surrounding water, even at very great depths.† The construction of the instrument, of which a drawing is annexed, is very simple. Upon one end of a narrow plate of metal, rather exceeding a foot in length, are fixed three scales of temperature, ranging from 25° to 100° Fahrenheit. Upon one of these scales the present temperature is indicated by the point of a needle, which turns upon a pivot in its centre, and on the other scales register indexes are pushed by the needle to the maximum and minimum temperatures, where they are retained by stiff friction. To the needle are attached, at equal distances from the centre, by connecting pieces, the free ends of two compensation bars, composed of brass and steel rivetted together, the other ends of the bars being fixed to the above-mentioned plate of metal.

The needle is governed by the lateral motion of these bars consequent upon variation of temperature. Two bars attached to the needle are used in order to prevent disturbance of the indication by lateral concussion. For a stationary thermometer the motive power of a small compensation bar would be sufficient. Although contrived for a special purpose, this simple instrument may be used in all experiments upon temperature, and in surveying expeditions it may be serviceable in giving notice of variation of depth of water, and the necessity of taking soundings. A diminution of temperature of water has been observed by scientific voyagers to accompany diminution of depth, as on approaching hidden rocks or shoals, or nearing land or icebergs.



a—Brass plate or frame.
bb—Compensation bars.
c—Block of brass connecting bars with frame.
d—Connecting pieces, connecting bars *bb* with needle *E* at points equidistant from centre.
E—Moving needle, with a pin at *e* for adjusting the register hands.
f—Register hand for cold.
g—Register hand for warmth.
h—Scales of temperature.
i—Caoutchouc rings suspending thermometer in its brass case.

* The instrument has been tested and approved by Mr. James Glaisher, F.R.S., whose experiments upon the temperature of water upon different depths, made some years since, suggested the adoption of a metallic thermometer.

† Water compressed by Mr. Perkins, under a pressure of 1,120 atmospheres (equal to the pressure of about 5,600 fathoms in round numbers), suffered a diminution in bulk of six one-hundredth parts, so that the 94 parts into which the 100 parts were compressed would require a density or specific gravity rather above 1·06.

The specific gravity of brass is .... 8·39
The specific gravity of steel is .... 7·81

NEW REVOLVING PISTOL.

The following are the points to which its inventor, Mr. Kerr, calls special attention:—

1st. By the introduction of the ordinary back-action Gun-lock, which, with the addition of one limb only, revolves the cylinder, this revolver is rendered as simple as any single barrel pistol.

The lock can be cleaned by any one conversant with fire-arms, and it can be repaired by any Gun-maker or Armourer, thereby obviating the objections which have been hitherto raised to the general use of Revolvers, from the complicated nature of their action.

2nd. The lock being fitted into the stock in the usual method is completely closed up; no wet or dirt can get inside it; the exploded caps cannot be blown off the nipples into the action, rendering the pistol useless for the time, and the limbs of the lock are not exposed to injury by the gas from the discharge (as in other revolvers), which soon rusts and spoils them.

3rd. A raised boss or shield protects the nipples, and prevents the chance of accident by anything striking the caps, in suddenly withdrawing it from the holster, belt, or otherwise.

4th. The body and barrel being separate, enables the former to be case-hardened, which adds greatly to its strength.

5th. A very simple and powerful lever is used for the ramrod; it is placed under the barrel, and has a spring catch, which prevents its being shaken out by the recoil in shooting, and the plunger working in a hole drilled true with the axis of the bore of the cylinder, insures the ball being correctly inserted.

6th. Simplicity and strength have been studied in the general construction of the pistol.

EDUCATIONAL APPARATUS.

The following is a description of two illustrative models invented by G. R. Smalley, B.A., F.R.A.S., Head Mathematical Master in King's College School, London; Lecturer on Natural Philosophy at St. Mary's Hospital:—

The Trigonometrical Demonstrator.—This instrument consists of a graduated circle, furnished with a revolving radius, a fixed horizontal bar, and a vertical bar, which, being suspended at its centre from the extremity of the radius, always retains a vertical position. The horizontal and vertical bars are graduated in opposite directions from their centres—one-half having positive, the other half negative readings. For angles less than 180°, the perpendicular on the base is formed by the lower and positive half of the vertical bar; for angles greater than 180°, by the upper and negative half. The length of the perpendicular is always estimated from the upper edge of the horizontal bar; that of the base to the vertical line through the centre of the perpendicular. The object of the instrument is to elucidate the meaning of the Trigonometrical Terms and Ratios; Supplemental and Negative Angles; to obtain, with sufficient accuracy for illustration, the numerical values of Trigonometrical Ratios; and to exhibit, mechanically, their changes in sign and magnitude as the angle increases from 0° to 360°. For the convenience of tutors who may adopt the original *Line Definitions*, two additional bars are provided, to show the tangent and secant of angles less than 75°; one of them is to be fixed to the extremity of the radius at right angles to it, after removing the vertical bar. The other forms a prolongation of the base.

Parallelogram of Forces Illustrator.—This apparatus, which illustrates the fundamental principle of Mechanics, consists of a Parallelogram with moveable sides, and diagonal, which can be so adjusted that two of the adjacent sides may have any relative magnitude, and be inclined to each other at any proposed angle. One extremity of the diagonal is at the centre of a graduated circle, by which the directions of the sides and diagonal of the Parallelogram are determined. Three strings, meeting in a point at the centre of the instrument, pass over pulleys, two of which are moveable, so that the directions of the strings may be made to coincide with the sides and diagonal of the Parallelogram. From the extremities of these strings weights may be suspended; and the combined effect of two of these in the directions of the sides of the Parallelogram, is shown by a mechanical contrivance to be the same as that produced by their resultant in the direction of the diagonal.

Proceedings of Institutions.

Gosport and Alverstoke Literary and Scientific Institution.—Mr. H. D. P. Cunningham has resigned the Presidency of this Institution, his successor being Captain Richard Purvis, R.N.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Medical, 8½.
Royal Geographical Society, 8½. "Some Remarks on the Physical Geography of the Ocean in connection with the Antarctic Regions." By Capt. M. F. Maury, of the United States.

Tues. ...Civil Engineers, 8. Mr. Wm. Henry Preece, "On the Maintenance and Durability of Submarine Cables in Shallow Waters."
Medical and Chirurg., 8½.

Wed. ...Society of Arts, 8. Mr. F. T. Buckland, "On the Acclimatization of Animals."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, November 16th*, 1860.]

Dated 21st September, 1860.

2304. J. Fisher, Carrington, Nottinghamshire—Imp. in machinery or apparatus for treating clothes and other articles whilst in a wet condition, for the purpose of drying or partially drying the same.

Dated 26th September, 1860.

2342. L. Buchholz, Manchester—Imp. in carbonising sawdust, and other finely-divided vegetable substances, and in obtaining certain useful products by such carbonization, and in apparatus connected therewith.

Dated 13th October, 1860.

2498. H. W. Harding, 108, Regent-street—An improved combined sandwich-case and drinking flask.

Dated 18th October, 1860.

2538. T. J. Marshall, Bishopsgate-street Without—Imp. in the manufacture of paper, and in machinery or apparatus for effecting the same.

Dated 19th October, 1860.

2552. J. Thompson, E. G. Fitton, and F. A. Fitton, Manchester—Imp. in machinery used in boring, turning, and cutting metals and other substances, part of which is applicable for driving other machinery.

2554. J. Marsden, 75, Turnmill-street, Clerkenwell—An improved method of bleaching and whitening fibres and fabrics of various kinds.

2558. J. Burch, Crag, near Macclesfield, Cheshire—Imp. in the construction of boilers for generating steam and other heating purposes.

Dated 20th October, 1860.

2565. E. W. Hughes, 22, Parliament street—Imp. in the construction of tents particularly adapted to military purposes, part of which invention is equally applicable to temporary buildings generally.

Dated 22nd October, 1860.

2568. J. Smith, Manchester, and J. Holt, Farnworth, near Bolton-le-Moors, Lancaster—Imp. in machinery for preparing and spinning cotton and other fibrous materials.

2570. C. G. Russell, Manchester—An improved method of and apparatus for, facilitating the operation of certain kinds of printing from engraved plates, cylinders, lithographic stones, letter-press blocks, and other like surfaces.

Dated 23rd October, 1860.

2580. Edwin Lewis, Birmingham—An improved apparatus for washing, cleaning, or separating particles of metal from other refuse matter.

Dated 26th October, 1860.

2608. F. S. Barff, Dublin—Imp. in the production of artificial stone, which improvements are also applicable to the preservation of stone, bricks, tiles, and other analogous substances or materials.
2610. W. Sharpe, Swadlincote, Derbyshire—Imp. in latches and locks.
2612. T. Cobley, Meerholz, Germany—Imp. in the manufacture of white lead (meaning carbonates of lead.)
2616. R. A. Brooman, 166, Fleet-street—Imp. in uniting water, gas, and other pipes and tubes. (A com.)
2618. W. Syrett, Bury St. Edmunds, Suffolk—Imp. in steam engines.

Dated 27th October, 1860.

2620. C. Hathaway, Liverpool—Imp. in the construction of street railways, and in the wheels to run thereon.
2622. H. Lawson, Holcomb-brook, near Bury, Lancashire—Imp. in machinery for putting cop tubes on to the spindles of mules for spinning, and in apparatus for supplying the cop tubes to the said machinery.
2626. T. Smedley, Holywell, Flint—Imp. in the manufacture of metal rollers and cylinders used for calico printing, and other purposes.
2628. W. Hunt, Tipton, Staffordshire—Imp. in obtaining sulphur, or certain sulphur compounds from certain other sulphur compounds, and in obtaining carbonic acid.
2630. E. K. Dwyer, Pimlico—Imp. in machinery for doubling, creasing, and folding cloth.
2634. W. E. Newton, 66, Chancery-lane—Improved apparatus for milking cows. (A com.)

Dated 29th October, 1860.

2626. E. Blacklidge, Bolton-le-Moors, Lancashire—Imp. in the preparation of materials for sizeing, dressing, or finishing warps, yarns, textile fabrics or paper.
2638. T. Wilson, Birmingham—Imp. in moveable spanners or screw wrenches.
2642. E. Harrison, W. Bradbury, J. Buckley, and D. Garside, Oldham—A certain compound, or certain compounds, to be used as a substitute for gunpowder.

Dated 30th October, 1860.

2650. I. Dreyfus, Paris—Imp. in rolling iron, and in machinery employed therein.
2652. J. Beck, 10, Isabella-street, Broadwall, Christchurch, Surrey—Imp. in stop valves for water, steam, and other fluids.

Dated 31st October, 1860.

2662. L. Martin, 9, Tenison-street, York-road, Lambeth, and O. Penfold, 4, Blackmoor-street, Drury-lane—Imp. in the manufacture of candles.
2664. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in boxes for railway carriage axles and other shafts. (A com.)
2666. J. Anderson, Belfast, Ireland—Imp. in the manufacture of felt, and in the mode of applying the same to railways and to other uses.

Dated 1st November, 1860.

2667. W. Reynolds, Prior-cottage, and G. A. Samson, Duck-lane, Edmonton, Middlesex—Imp. in the manufacture of boots and shoes.
2668. D. Joy, Manchester—Imp. in the valves of steam hammers, which are also applicable to other purposes.
2669. F. Johnson, 12, North street, Westminster—Imp. in fixing screw piles and moorings.
2671. E. F. Prentiss, Philadelphia, U.S.—Imp. in the combination of chemical materials for scouring, bleaching, and dying wool, cotton, silk, and other materials.
2672. J. Underhill, Loveday street, Birmingham—Imp. in window sash and casement fasteners.
2673. W. Edwards, Manchester—A self-acting apparatus for regulating and adjusting the pressure of gas and other fluids.
2674. W. E. Newton, 66, Chancery-lane—An improved mode of preparing or insulating electric conductors for telegraphic purposes either on land or under water. (A com.)
2675. W. Bryant, 5, Lipson-terrace, Plymouth—Imp. in treating oily and fatty substances.
2676. C. Harratt, Hornsey-lane, Highgate—Imp. in machinery used in giving motion to a shaft or axis used in propelling vessels, ploughs, and machinery.
2677. J. Bettyes, 15, Upper Gloucester-street, Middlesex—Imp. in carriages and carriage springs."
2678. R. Murray, 29, Sandhill, Newcastle upon-Tyne—Imp. in the manufacture of telegraphic cables or ropes.

Dated 2nd November, 1860.

2680. H. Davidson, Spray's-buildings, and J. McDonald Ellercamp, Powis-street, Woolwich—Improved apparatus for lowering and disengaging ships' boats from their tackles, parts of said apparatus being applicable to the lowering and disengaging of other heavy bodies or merchandize.
2684. J. Leonard, and B. Lorentz, Skinner's-place, Size-lane—Imp. in the manufacture of ornamented woven fabrics when chenille is employed.
2686. M. Clark and A. Clark, Glasgow—Imp. in packages or holders for containing biscuits.
2688. W. T. Denham, 18, Wilmington-square, Clerkenwell—Imp. in producing devices on velvet, paper, and other fabrics or materials.

Dated 6th November, 1860.

2713. M. R. Leverson, 12, St. Helen's-place—Imp. in fire-arms. (A com.)
2715. E. P. H. Vaughan, 15, Southampton-buildings, Chancery-lane—An improved plug for boats.
2717. W. Hewitt, Birmingham—An imp. or imp. in whip holders or whip sockets.
2719. W. Jones, 246, High Holborn—Imp. in machines or presses, and apparatus attached thereto, for stamping or embossing paper or other substances.
2721. W. Birks, sen., and W. Birks, jun., Nottingham—Imp. in bobbin, net, or twist lace machinery.
2723. J. R. Gyton, Grimsthorp, Lincolnshire—Imp. in paddle wheels.
2725. C. Asprey, New Bond-street—An imp. in locks for bags, dressing cases, and other articles.
2727. R. A. Brooman, 166, Fleet-street—An imp. in the manufacfacture of forks and spoons. (A com.)
2729. T. W. Smith, Lower-road, Islington—An improved process for obtaining pigments.
2731. T. Cobley, Meerholz, Germany—Imp. in the method of treating poor ores of copper.

INVENTIONS WITH COMPLETE SPECIFICATION FILED.

2759. C. Stevens, 18, Welbeck-street, Cavendish-square—An improved machine for raising water. (A com.) 9th November, 1860.
2771. H. W. West, Attleborough, U. S.—A machine for pressing and shaping straw hats or various other articles of like character. 12th November, 1860.

PATENTS SEALED.

[*From Gazette, November 16th*, 1860.]

November 11th.

1228. H. N. Nissen.
1240. C. Binks & J. Macqueen.
1243. T. Blakeley.
1245. T. W. Teulon.
1246. W. Barker.
1247. J. Craig.
1253. G. Moulton.
1256. S. Hood.
1270. T. Cope.
1272. M. Cavanagh.
1274. G. Bartholomew.
1280. D. Mulkay.
1292. E. De Block-Stevens.
1374. G. Fletcher.
1455. M. Henry.
2119. J. Fisher and J. Fisher.

[*From Gazette, November 20th*, 1860.]

November 20th.

1260. W. T. Shaw.
1261. J. Bottomley.
1271. W. H. Burnett.
1278. T. Heppleston.
1287. R. C. Clapham & R. Cail.
1291. F. W. Prince.
1301. E. T. Hughes.
1303. G. Elliot.
1305. R. A. Brooman.
1307. J. Dale.
1319. C. Berck.
2343. J. A. Manning.
1409. J. Wright.
1481. J. Braby.
1845. J. Rahill.
2233. R. Mushet.
2269. W. E. Newton.
2333. T. S. Truss.
2341. W. Macnab.
2413. T. M. Richardson.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, November 13th*, 1860.]

November 12th.

2858. W. J. Gifford.

November 13th.

2866. J. Macintosh.
2925. G. J. Bensen.

November 14th.

2864. G. P. Wheeler.
2892. A. F. Germann, F. G. Germann, and J. Germann.

[*From Gazette, November 20th*, 1860.]

November 17th.

2893. A. A. Salomon-Cohen.
2909. J. Clarke.
2927. J. M. A. E. Fabart.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, November 16th*, 1860.]

November 12th, 1860.

2634. H. Willis.
2639. W. Smith.

[*From Gazette, November 20th*, 1860.]

November 15th.

2684. J. H. Brown.

Journal of the Society of Arts.

FRIDAY, NOVEMBER 30, 1860.

INTERNATIONAL EXHIBITION OF 1862.

The correspondence between the Commissioners for the Exhibition of 1851, the Society of Arts, and the Trustees for conducting the Exhibition of 1862, has been brought to a satisfactory conclusion, as will be seen by the accompanying letter, addressed to the Secretary of the Society of Arts. This correspondence has had relation to the site for the building, the provision of the necessary funds, the incorporation of the Trustees by the authority of the Crown, and their relations with the Commissioners for the Exhibition of 1851 :—

London, November 22nd, 1860.

Sir,—We have to acknowledge the receipt of your letter of yesterday, enclosing the copy of a communication from Her Majesty's Commissioners for the Exhibition of 1851 to the Council of the Society of Arts, in which the Commissioners express their general approval of the object which the Society has in view in organising the Exhibition of 1862, and their willingness to render such support and assistance to the undertaking as may be consistent with their position as a chartered body, and with the powers conferred upon them by their Charter of Incorporation.

Under these circumstances we have to request that you will intimate to the Council of the Society of Arts our willingness to accept the Trust which the Council and the Guarantors have in so flattering a manner expressed a wish to repose in us, on the understanding that the Council will forthwith take measures for giving legal effect to the Guarantee, and for obtaining a Charter of Incorporation satisfactory to us.

We have the honour to be,

Sir,

Your obedient servants,

(Signed) GRANVILLE,
CHANDOS,
THOMAS BARING,
C. WENTWORTH DILKE,
THOMAS FAIRBAIRN.

P. Le Neve Foster, Esq.,
Secretary to the Society of Arts.

The Guarantee List includes 662 persons, and the sum guaranteed now amounts to £366,800. The Commissioners for the Exhibition of 1851 have granted a site for the building on their estate at South Kensington.

SECOND ORDINARY MEETING.

Wednesday, November 28, 1850.

The second Ordinary Meeting of the One Hundred-and-Seventh Session was held on Wednesday, the 28th inst., Professor Owen, F.R.S., in the chair.

The following gentlemen were proposed for election as Members of the Society :—

Chandos, Marquis of	Wootton, near Aylesbury.
Cornforth, John	Berkley-street Mills, Birmingham.
Fairbairn, Thomas	Northwood, Manchester.
Hunt, John	156, New Bond-street, W.
Millar, John, M.D.	Bethnall-house, Cambridge-heath, N.E.
Nicholls, G. P.	Aldine-chambers, Paternoster-row, E.C.
Roskell, Robert	156, New Bond-street, W.
Yolland, Col. W., R.E....	17, Westbourne-park, W.

The following Institutions have been taken into Union since the last announcement :—

Worcestershire Union of Educational Institutes.
Andersonian University Popular Evening Classes, Glasgow

The Paper read was—

ON THE ACCLIMATISATION OF ANIMALS.

By F. T. Buckland, M.A., Student of Christ Church, Oxford, Assistant-Surgeon, Second Life Guards.

In the present days of progressive movements we find that knowledge of details, and experience of facts, are collected into one focus, and made to bear upon the object aimed at by the means and operations of societies. We have amongst us societies which take cognizance of, survey, and reduce to practice almost every branch of human knowledge, whether in Science or in Art.

There is, however, one subject which until the last few months would seem to have escaped the busy minds of our fellow-countrymen, I mean the art and science of Acclimatisation, a term which may be said to comprehend the art of discovering animals, beasts, birds, fishes, insects, plants, and other natural products, and utilizing them in places where they were unknown before.

The importance of this art has not escaped our neighbours the French ; and in Paris there has been established, since the year 1854, a society called "La Société Impériale d'Acclimatation," of which I shall have more to say hereafter in the progress of this paper. But it may be asked, what is the use of acclimatizing animals in *this* country? have we not already the best that the world can procure? The answer is, you may think you have the best, but good is the best, till something superior is discovered.

On 22nd January, 1860, I had the good fortune to be invited to a dinner, which will, I trust, hereafter form the date of an epoch in natural history—I mean the now celebrated Eland dinner, when for the first time the freshly-killed haunch of an African beast was placed on the table of the Aldersgate Tavern.

The savoury smell of the roasted beast seemed to have pervaded the naturalist world, for a goodly company were assembled all eager for the experiment. At the head of the table sat Professor Owen himself, his scalpel' turned into a carving-knife ; and his gustatory "apparatus' in full working order.

It was indeed a Zoological dinner, to which each of the four points of the compass had sent its contribution. We had a large pike from the west, American partridges shot but a few days ago in the dense woods of the

transatlantic east), a wild Goose (probably a young bean-goose) from the north, and an Eland from the south. The assembled company—the ardent lovers of nature in all her works—most of them distinguished in their individual departments.

The gastronomic trial over, we next enjoyed an intellectual feast in hearing from the Professor his satisfaction at having been present at the inauguration festival of a new epoch in natural history. He put forth the benefits which would accrue to us by naturalizing animals from foreign parts—animals good for food, as well as ornamental to the park. The glades of South Africa have been described by numerous travellers as reminding them forcibly of the scenery of many of our English parks; and here were the first fruits of the experiment as to whether the indigenous animals of these distant climes would do well in our own latitudes. The experiment was entirely successful, and he hoped would lead to more, and that we might one day see troops of elands gracefully galloping over our green sward, and herds of Koodoos, and other representatives of the antelope family, which are so numerous in Africa, not only enjoying their existence in English parks, but added to the list of food good for the inhabitants of not only England, but Europe in general. The Vice-Chairman, the late Mr. Mitchell, then instanced the case of the Indian pheasants already in course of naturalization at several points in England, and expressed his conviction that the American partridges we had just partaken of, as well as the European Gelinotte, would thrive well in our woods and copses, particularly in Kent, and that there could not be any great difficulty in getting them over from America for this purpose. Elands, since the present experiment had become public, had been found to answer every expectation; 'they had risen in the market;' the demand much exceeded the supply, and there were numerous applicants for them, whose demands, he was sorry to say, the Zoological Society could not now satisfy. There were, however, plenty more elands in South Africa to be had for the trouble of importing them. A fresh supply was much wanted, and he trusted that this subject might be taken up by those who had convenient pasture ground for them in England, and who would be patriotic enough to further the important cause of the acclimatisation of useful exotic animals in English parks and homesteads.

Professor Owen himself, a few days afterwards, wrote a letter to the *Times*, in which he speaks highly of Eland as a meat, and advocates the cause of acclimatisation. These observations, both verbal and printed, of the learned Professor made a deep impression on all who read or heard, and I may add more especially on my own mind, for they showed us how that science, even in her gravest moods, bends to utility, and that there was a grand uncultivated field open to those who would take up the subject in earnest. Shortly afterwards there appeared a remarkable article in the *Edinburgh Review*, No. 224, Jan. 1860, upon the "Acclimatisation of Animals," which we have good reason to believe emanated from the pen of that most accomplished and practical naturalist, Mr. Mitchell, now, alas! no longer among us. This gentleman had evidently been struck with the idea of forming, in England, a society for acclimatisation, similar to that in Paris, which he had just undertaken to manage.

But before going further, I must beg to give an outline of this now justly celebrated society, which has been published, from the pen of an accomplished gentleman, in the columns of the *Field* newspaper. We learn that the Acclimatisation Society was formed at Paris, on the 10th of February, 1854; that, at least, was the date on which it took material form. It was presided over and addressed by M. Isidore Geoffroy Saint Hilaire, who, in a speech full of good sense and sound logic, unfolded the scheme of the society. He told them that the association they were about to form was, up to that day, without an example, that it was to be composed of agriculturists, naturalists, landowners, all the scientific men, not only of France, but of every civilised country, all of whom would aid in a work which required the help of everybody, because it was for the good of everybody. The prospect was, said he, nothing less than to people our fields, our forests, and our rivers with new guests; to increase and vary our alimentary resources, and to create other economical or additional products. In the vegetable kingdom much had already been done; but in the animal almost nothing. We have not one of those Mammifera which are so useful to the inhabitants of Asia and America, and to their indigenous game the French had added three species only—the rabbit, the kid, and the pheasant. M. Saint Hilaire then proceeded to point out that, although their ancestors had done much for them in adding to the aboriginal stock of animals and fowls, very few additions had been made in modern times. Immediately after the discovery of America, the Spaniards added a few birds to the European stock from the new continent, but no animal of any use to our farms or poultry-yards.

In its first proceedings the society was very modest. At the present time it numbers more than two thousand members, and includes within its roll thirty-five royal names, from the Emperor of the French to the King of Siam, from the Sovereign Pontiff to the Emperor of Brazil. It also possesses a splendid garden, more than 33 acres in extent, in the Bois de Boulogne, and every convenience and appliance for carrying out its principles.

The influence of the Society began to be very speedily felt, and in 1855 a report was presented to the members, from which it appeared that there had arisen in other parts of France a desire to form similar institutions, which were to be affiliated to the parent stem—a movement which was thought well worth the encouragement of the Society—which accordingly affiliated to itself the Zoological Society of Acclimatisation for the Region of the Alps. At the same time it took into correspondence various local and departmental agricultural societies, and determined to enlarge its plans, so as to admit the vegetable as well as the animal kingdom.

In the year 1858, however, it was resolved to take a step in advance, and obtain a garden of an extent sufficient for the purposes of the Society. Thanks to the concurrence of the Imperial Government, and of the Municipality of the City of Paris, this was easily managed, and a space of ground in the Bois de Boulogne, nearly three times as large as the Zoological Gardens in the Regent's-park, was placed at the disposal of the Society.

Perhaps the best exemplification of the manner in which the French Acclimatization Society set to work, is afforded by the list of prizes which they offered to the competition of the members in the year 1857. It was as follows:—

1. A medal worth £80, for introducing into the mountains of Europe or Algeria a flock of pure Alpacas (*Auchenio paca*). The flock must consist of three males and nine females at the least.

2. A medal worth £40, for the complete domestication, application to agriculture, or employment in towns of the Kiang (*Equus hemionus*), a valuable beast of burden, of great power and swiftness, which belongs to Thibet, or the peetsi (*Asinus Burchelli*), a South African animal, nearly allied to the zebra, but much resembling the horse. The domestication includes reproduction in captivity.

3. A medal worth £40, for the domestication and multiplication of some large species of kangaroo—*Macropus giganteus*, *M. fuliginosus*, or some other species of a similar size. The winner of this prize must possess, at least, six specimens, and must have bred two generations in domesticity.

4. A medal worth £60, for the introduction and domestication of the Australian emu (*Dromaius Novæ Hollondiæ*), or the American ostrich (*Rhea Americana*). To this are attached the same conditions as the preceding prize.

5. A medal worth £40, for the domestication of the great bustard (*Otis tarda*). To obtain this prize six adult

specimens must be produced which have been reared in domesticity.

6. A medal worth £20, for the domestication and acclimatization of some new bird of game. Exception taken against all those birds that will injure crops. [Which exception, if severely construed, seems to us as tantamount to a prohibition.]

7. A medal worth £20 for the introduction of an eatable fish into the sweet or brackish water of Algeria.

8. A medal worth £40 for the complete acclimatisation of some new species of silkworm producing silk that may be spun.

9. A medal worth £20 for the acclimatisation in Europe, or in Algeria, of some wax-producing insect, not a bee.

10. A medal worth £20 for new varieties of the Chinese Yam (*Dioscorea batatas*) superior to those which have already been obtained, and easier of cultivation.

11. A medal worth £60 for the introduction, cultivation, and acclimatisation of the quinine (*Cinchona*) in Europe, or any of the European colonies.

To this list was added, by the private enterprise of M. Chagot, a member of the society, a prize of £80 for the domestication the African ostrich (*Struthio camelus*) in France, in Algeria, or in Senegal, it being necessary to produce from two or more ostriches at least two generations, and at least six specimens hatched in a state of domestication, the method of reproduction being as explicable as that of any other bird in the poultry yard.

Thus, we find that in its earliest operations the society paid the greatest attention to increasing the vegetable wealth of the country, not forgetting, meanwhile, its principal and even more important duty—that of gaining acquisitions in the animal kingdom.

The proceedings of this valuable Society are now published monthly, and we find in these pages many articles of the most valuable description on the details of acclimatisation; correspondence from all parts of the world, and references to books which bear upon the subjects undertaken. I have not space for an analysis of the various and important branches of human knowledge, which, but for the efforts of this society, would most probably be lost to the public welfare.

This, then, is an imperfect outline of the plan of the society which Mr. Mitchell left us to superintend. He has, however, left us a valuable legacy of the before-named article in the *Edinburgh Review*, in which he seems to have put forth his ideas of acclimatisation, as applied to our own country; and as this paper contains so many valuable hints from long experience, that experience I feel it incumbent upon me to put forth in many of the ideas as to details, that honour should be given where honour is due. He begins with a passage from Lord Bacon, who, among the inventions of the island Altantes, shadows forth the practice of acclimatisation, in the following words:—

"We have also parks and enclosures of all sorts of beasts and birds, which we use not only for view or rareness, but likewise for dissections and trials, that thereby we may take light what may be wrought on the body of man; wherein we find many strange effects; as continuing life in them, though divers parts, which you account vital, be perished and taken forth; resuscitating of some that seemed dead in appearance, and the like. We also try poisons and other medicines upon them, as well of surgery as physic. By art, likewise, we make them greater or taller than their kind is, and contrariwise dwarf them and stay their growth We make them more fruitful and bearing than their kind is, and contrariwise barren and not generative. Also, we make them differ in colour, shape, activity, many ways. We find means to make commixtures of divers kinds, which has produced many new kinds, and them not barren, as the general opinion is............ We have also particular pools, where we make trials upon fishes, as we have said before of beasts and birds. We have also places for breed and generation of those kind of worms and flies which are of special use, such as are with you your silkworms and bees."

Having enumerated the various so-called zoological gardens in Europe, Mr. Mitchell states of them that they have addressed themselves rather to mere exhibition than to reproduction and acclimatisation, and then startles us with the astonishing fact that since the Christian era the only additions to our catalogue of domesticated animals have been four in number, viz. :—

In 1524 the turkey.
In 1650 the musk duck.
In 1725 the gold pheasant.
In 1740 the silver pheasant.

Here then is an answer to the question of the sceptic who believes we have the best of every thing; and if he be a gastronome, we appeal to that love of good feeding which we all have more or less, and ask him, if it were not for the acts of acclimatisation which took place in 1524 and 1725, what would he have for dinner on Christmas-day to face the roast beef, and where would his pheasants be which he takes so much pride in preserving in his coverts.

Now if we were to order a taxidermist to set up and prepare a series of all the animals *we use* in England, whether for food or for ornament, we should, I think, state that they might be all placed in a comparatively small space. But let us walk along those marvellous galleries of the British Museum which are devoted to zoology, and we shall then see how plentifully the world is stocked with life, and how little use we have made of that life; nay, we may go even to the geological gallery and find the bones of creatures which have long been extinct in this country, but whose representatives still enjoy life in distant climates.

In fact, to reduce this matter to figures, the learned President of the Acclimatisation Society in Paris tell us that the world furnishes a list of no less than one hundred and forty thousand animals, and out of this vast catalogue we limit our attention to the small number of forty-three.

I now propose to examine into this catalogue of animal life, and to see which among the numerous individuals composing it we can point out as likely to be of future use to us. I shall not do this at random, but taking as my guides the observations of Mr. Mitchell in the Edinburgh article, and also the guide of the gardens of the Zoological Society of London, I shall endeavour to point out those animals and birds which from actual experience have been proved to live in this country, and also to multiply their species. There being no reason why, having once bred, they shall not breed and multiply again.

The Eland.

To begin with what may well be called the most noble, the largest, the heaviest, and the most useful of the deer tribe, we may well instance the eland, of which I have the opportunity of showing you a magnificent head, through the kindness of Mr. Roberts, furrier, of Regent-street. As Mr. Mitchell justly observes:—"The eland is the *gibier par excellence* of the South African wilderness; his brisket is 'the dainty bit they set before the King.' Every travelling sportsman in Caffraria agrees upon the fine quality of this meat, and a trial made in England in the beginning of last year, under very unfavourable circumstances, fully confirms all that they have said, for the Eland is no longer exclusively African."

In the catalogue of the animals living at Knowsley when the late Earl of Derby died, in 1851, figured five elands, two males and three females, one of which had been born there. The Zoological Society succeeded to this little herd by bequest. The noble collector had been their President for more than twenty years. He had witnessed the decline of the establishment in the Regent's-park to all but inanition in 1847 with regret, and had rejoiced in the subsequent resuscitation which the Council, in their last report, have candidly and handsomely acknowledged to be due to the exertions and ability of their former secretary, Mr. Mitchell. Desirous of marking his sympathy with this management, Lord Derby directed

that whatever group of animals should be considered most eligible for the purpose of acclimatisation, at the time of his death, should be transferred from the Knowsley collection in its entirety to the Society's possession. By the advice of Mr. Mitchell, the elands were most judiciously chosen, and the result has justified all the expectations which he formed of them. The progress of this acclimatisation, which is now perfected, is related in a short paper published in the "Bulletin de la Société Impériale d'Acclimatation," and subsequently noticed in the report of the Society, read at their last anniversary. It appears, from the table given in this document, that up to the 29th of April last twenty eland calves had been produced in England from the Knowsley stock, independently of any which may have been obtained from three of the earliest born females, which were exported to the Continent. If the whole number had been kept together up to this time, as was, we believe, the intention of Mr. Mitchell, the united herd would not count less than thirty head. With such a commencement, it is clear that the progress of this interesting labour would have gone on much more rapidly; and that the next five years, instead of ten, would have made the eland not uncommon in our parks.

The merit of the first step towards the acclimatisation of the eland in England is incontestibly due to the late Lord Derby. More than twelve years ago his first importation arrived. They bred; but he unfortunately parted with a male. Accident reduced his stock to single female, who remained barren. Nothing discouraged, he recommenced, and in 1851 the animals, so soon transferred to the Zoological Society, arrived—the female in February, the male in July. They were young, and their first calf was not born until 1853—since then the work has proceeded with great success.

Herds of this noble antelope have been founded at Hawkstone, by Viscount Hill; at Taymouth, by the Marquis of Breadalbane; and at Tatton, by Lord Egerton. The stock of the society is still very strong and vigorous, and will, if well managed, continue to supply the nucleus of future home-bred herds—for which applications are constantly made—for years to come.

Lord Hill was the first to profit by the opportunity offered by the society, and he has no less than eight of these animals roaming in his deer park, after having slaughtered a six-year-old male for the table in January last. Though anything but fat, this first essay of the quality of English eland venison satisfactorily corroborated the character unanimously given to it by African sportsmen, travellers, and colonists; the verdicts were taken in not a few gastronomic laboratories—royal, noble, and scientific.*

Nothing can be more stately than the eland, leading out his family along the lovely slopes of Hawkstone, where "a great rocky ridge rises in the midst of the park, and stretches nearly through it, affording every variety of shelter. There the pale tawny flanks of the antelope glisten in the morning light; infinitely surpassing the dun deer in colour, while they rival them in grace, and their great size makes them immediate objects of attention. Their clean, small legs, full of power, push them over hill and dale at a tremendous pace; and if an obstacle opposes, their faculty of leaping is almost incredible compared with their weight."

In order to bring the information relative to the breeding of the eland up to the last moment, I took the liberty of writing to Lord Hill, who most kindly sent me, a day or two ago, the following particulars:—"The elands are going on very satisfactorily, notwithstanding the wet and cold they have been exposed to during the last summer, having no shed or indulgence of any kind since they were turned out in the park in May; they are, however, now in a large paddock with a shed in it. I have been most successful in breeding and rearing them, not having lost one. I have now six females and three males, and I hope four of them are in fawn, which will make a good herd next season." By the kindness of Mr. Bartlett, I am enabled to give the present stock of elands in the Zoological Society's Gardens, viz.:—five females and one male, all doing well, and in good health.

Here, then, we have good evidence that elands will do well in this country. Let us hope that some day they may become so common as to be used for ordinary butcher's meat.

After the elands, I must not omit to mention the smaller of the antelopes. I may mention the Leucoryx, the Gnu, the various kinds of gazelles, and several others, many kinds of which I am enabled to show this evening through the kindness of Mr. Bartlett and Mr. Leadbeater. Those who wish to see admirable and spirited pictures of the heads and horns of these can do so by referring to Routledge's Natural History, by the Rev. J. Wood, parts xiv., xv., xvi., Vol. I.

Antelopes are delicate things to rear, but yet we find recorded that the harnessed antelope "breeds freely in confinement," as will most probably the Boschbok. The springbock will also live in our parks, and we find a history of them recorded as living in Lord Hill's park, by Mr. Mitchell.

Among the antelope family, as an ornamental animal nothing can excel the eland, except perhaps the Koodoo, which under similar treatment might be acclimatised with equal certainty. As an addition to our economical resources it appears to be in no way inferior. It combines extraordinary quality of flesh with rapid growth, fecundity, and hardiness, in which it is not exceeded by our best short horns, which on the other hand very often fail to reproduce, through excess of fattening property, or from too closely related blood. The great difficulty in these antelopes is their liability to cold, but there is no reason why with shelter and care an attempt should not be made to keep them.

I now pass on to the deer tribe. We know how many thousands of pounds are annually expended in preserving the deer forests of Scotland, and with what result. Compare the comparatively pigmy heads which are brought home by our sportsmen with the heads of deer that do not live, in these days of steam, an immeasurable distance from the deer forests, and are by no means difficult to procure through the proper channels.

If we examine an Ordinance map, how many green spots shall we observe indicating the parks of noblemen and rich proprietors, many admirably suited for deer. Now, out of the deer family, how many are there now in England? but three, viz., the red deer, the fallow deer, and the roebuck. It may well be asked how many of the deer tribe are there on the face of the earth, and why have we so few in England?

The answer is given by Mr. Mitchell, who writes:—"Out of *forty-two* species of deer, exclusive of the little

* The following is a note on eland and eland venison, by the Hon. J. Berkeley:—The elands are at present in a paddock at Taymouth Castle, in the park of the black deer. They do very well; and there are at this moment two young ones bred there, who seem to be perfectly acclimatised. There is no sort of reason why they should not do well in all our parks, chases, and forests, as, when at large, there would be no more danger in them to man than in the red deer. As to the editorial remark appended to the question asked by A. B. in the last *Field*, the trial, at the dinner alluded to, of the flesh of the eland was not a fair one; the eland then dressed was not in season, and therefore no decisive opinion could have been formed as to fat, flesh, or flavour. In passing, I would observe that it is confinement or being in a half-tame state, that makes animals dangerous to man. The common fallow dear is so when reared by hand. The bison, the eland, the wapiti, the elk, the American antelope, if acclimatised and permitted to run wild in large parks or forests, would fly the presence of man; and my opinion is that the elk, from his knowledge of and ability to clear away the snow, would thrive in the Highland deer forests. These, and thousands of other animals and birds, domestic and wild, might be made available to the United Kingdom by the labours of the Acclimatisation Society.

moose deer of Tropical India, there is hardly one which would not adapt itself to our seasons."

First, as regards stags, there is no reason why the red deer of Scotland should not be crossed with the stag of the Odenwald, and those that, as Mr. Mitchell says, are at home in the woodlands of Central Europe, and thence eastward to the Carpathians.

Then, we have the wapiti, a magnificent deer, a native of the northern parts of America, of which I have the opportunity of showing a fine head, brought by the Hon. G. Berkeley, from America. This animal, be it remarked, "breeds every year in the Society's Menageries," and there is no reason why it should not be added, as an ornament, in many of our English parks, where there is room and proper food for it.

Then we have, in the catalogue, the Barbary deer (*Cervus-Barbarus*). This is the representative of our red deer on the southern shores of the Mediterranean. "The stag and hind, now in the gardens, were presented from the fine herd of this deer which adorns Lord Hill's park, at Hawkstone."

After the Barbary deer, we find the *Barasinghai Cervus Duvancellii*, first imported by the Earl of Derby, a native of Nepaul and Assam. Its winter coat is of a dullish grey, but in summer it changes to a brilliant golden hue, which would make the barasingha the most interesting addition which could possibly be introduced into a heavily-wooded park. Lord Hill, in a letter to myself a few days ago, writes,—"I have also a number of Barbary deer, about 16, and Sambur (another kind of deer), in the park, and these are doing very well." And then, what is most important, his lordship says none of them appear to interfere with the fallow deer, or the other stock.

There is, besides these, a very hardy deer,which breeds well in confinement, and whose home is in North America, I mean the Virginian deer. This animal would do exceedingly well in Scotland, is not difficult to procure, and is cheap in price; in fact, there is a pair of them in London for sale at this moment. There are other deer whose names must be mentioned, viz.:—a deer, nearly as large as the Bavasongha, which is found in Yucatan; a deer from South America (the *Blastocerus Paludosus*), a hardy little species, which is marked with a white circle round the eye. A roe, as large as a fallow deer, the Gemul of Moteria Molina, as well as the Tartarian roe.

Next to the wapiti, in size and beauty of antler, comes the Persian deer—*Cervus Wallachii.* I have also, through the kindness of Mr. Leadbeater, a fine head of this animal to show to the Society. This animal also will breed in England, for we read "The animals were ultimately sent to the Earl of Ducie, who, after keeping them three seasons, most liberally presented them (October, 1860) to the society." The two females now in the society's possession are both accompanied by their fawns, and there seems every probability of this fine species being permanently established. A few weeks ago (October 8, 1860) Viscount Powerscourt was kind enough to send me a catalogue of the deer, &c., in his park at Powerscourt, near Dublin. This nobleman is a most active promoter of the society, and his great success shows how much individual exertion may do. He has now in his park one bull nylgau, one cow ditto; two stag wapiti, three hind ditto; one Barbary stag, one hind ditto; one Sambur deer, six hinds ditto; one axis stag, two hinds ditto; one male llama, one female ditto; one white hind; and about thirty-five red deer; all these are in good health, and the nylgaus and deer breeding well.

Not many hundred miles from England lives the reindeer; from our earliest infancy we have heard of the great benefit the poor Laplanders derive from it—in a domesticated state they drink its milk; they clothe themselves with the skins; they eat its flesh, and use its sinews and horns; and all the time they use it as a beast of burthen, and drive about in sledges drawn by it. The English sportsman derives excellent sport in pursuing the reindeer in its wild state.

Here then is a beast which recommends itself to the owners of parks and deer forests, to the farmer, and, I was going to say, the cabman also. The Dutch have stolen a march upon us in this respect, for Mr. Bartlett tells me that in a recent visit to Holland he saw them in a state of domestication, and that they do well.

It is, I believe, an absolute requisite for the reindeer that it be not kept on a clay soil; the soil upon which they thrive and breed in Holland is sandy.

Who has not heard of the Moose deer, or elk of Canada, and mentally followed the hunter in his active foot-race after the animal, or enjoyed the scene, where in a cold frosty night, with the air so still that a crack of a twig can be heard for half a mile, the sportsman lies secreted, from time to time calling the moose through his trumpet of birch bark. I show on the walls the result of this exciting sport, a magnificent head kindly lent me by Mr. Leadbeater, and am inclined to put the question—Why should there not be moose in those parts of England which are suited to them? and why should the English sportsman have to traverse the vast Atlantic to obtain a shot at one of these noble animals?

It often happens that one entire race of men is, for the most part, dependent upon a race of animals, and we have a good example of this in the North American Indian, who derives much of his sustenance from the great bison of the prairies. Every one has read and heard of the vast herds of these animals that are annually pursued and hunted down, yet seem hardly to diminish in numbers. English sportsmen make special expeditions in search of these, and within the last few months the Hon. Grantley Berkeley has returned from an expedition which he undertook solely to kill these animals. He has brought home with him the magnificent trophy which, through the kindness of the Editor of the *Field*, I am now enabled to show you. What a magnificent animal for our English parks; it is not only ornamental, but also exhibits qualities which would in some persons' eyes give it greater charms. It is good to eat, and carries a hump on its shoulders, a taste of which would be quite sufficient to impress on the minds of our *gourmants* the necessity of becoming a convert to the acclimatisation of animals.

I need not refer to printed records as to whether the bison will live in this country or not. It is a fact accomplished. The Great Northern Railway will, with the permission of that noble-minded encourager of acclimatization, the Earl of Breadalbane, carry us not many miles from a magnificent park where we may see the shaggy monster of the prairies cropping Scottish grass, and watched by Scottish keepers, and thriving well (like most foreigners) upon the fat of our favoured land. Our worthy friend, *Punch*, has unknowingly given us a helping hand in our desire to acclimatize this beast, for he has given us a capital caricature, which not only makes us laugh, but confirms, throughout the length and breadth of the land, the fact, should it ever be doubted hereafter, that bisons lived in Scotland, A.D. 1860.

I must not forget to mention in this place those noble beasts the Aurocks, of Russia. A pair of these, as we well know, were, through the interest of Sir Roderick Murchison, sent by the Emperor of Russia, to the Zoological Gardens, where they might be alive now if a murrain, which at that time was prevalent among cattle, had not unfortunately carried them off. We trust that we may yet see another pair in this country.

There is yet another beast that should be mentioned, the Yak, of Asia, of which we hear from the French Society, that a cross between it and the cow produces a hybrid, "a beautiful animal, which unites the good qualities of both parents."

From the deer tribe I now pass on to other mammalia. And first let us, according to the rule I have laid down, see whether we cannot restore any of the British beasts whose bones we find fossil. In many parts of England, in Norfolk, Suffolk, Berkshire, Cambridgeshire, and in Scotland, we find fossil bones of the beaver; nay, more, Professor Owen

writes, tradition refers the name and arms of the town of Beverley in Yorshire to the fact of beavers having abounded in the neighbouring river Hull; and Pennant says that two or three waters in Wales still bear the name of Llyn-yr-assange, or the beaver lake. Now there are situations in abundance in the above-named counties where there is a great lake or stream, where beavers would, I am convinced, if properly protected and looked after, again establish their species. We all know how interesting this pretty harmless water engineer is in his habits; the ladies know how useful his fur is, and the hunters tell us he makes a capital dish when properly cooked. The specimens are exhibited by Mr. Roberts, furrier, Regent-street.

There is, I think, a vacancy in our English parks and farms for another useful and ornamental animal, which might easily be procured from Australia. My hearers I see have anticipated me when I recommend the kangaroo to their notice. I will not dilate upon their merits, but ask my readers to examine the flock of them at the zoological gardens, and to hear what the able and energetic secretary of the Zoological Society, Mr. Sclater, says about them. Bennett's kangaroo is the most abundant species in Australia, extremely hardy, and much the best calculated for acclimatisation in an English park. In favourable localities it breeds with regularity, and with very little attention would rapidly increase in any of the Midland or southern counties, where the soil is dry and the character of the ground affords shelter from the north-east. Mr. Gould asserts the excellence of kangaroo venison as a meat for the table, and the introduction of these animals would therefore be something more than a mere zoological luxury. Mr. Gould has kindly lent me a speci- of this animal. The skin makes good leather. There are many places, he tells me, in England where it would thrive admirably.

But we must not forget to mention an animal which would be very useful in this country, if it would live, but I fear the climate of England is not suited for it. There is now in common use a substance which is called "alpaca," and much might be written and said upon this subject. I prefer, however, to quote the words of my friend, Dr. Lankester, who, in his admirable lectures on the uses of animals in relation to man,* thus writes:—

"But I now pass to a family of animals that has recently yielded a large increase to our cloth manufacture. I allude to the alpaca tribe or family, allied to the camels and dromedaries. When Pizarro conquered Peru, he found these animals employed as beasts of burden, and their wool used for making clothing. The Peruvian Government has placed an embargo upon the exportation of these creatures, so that we have only now and then seen them as curiosities in the collection of our Zoological Gardens; but in 1846, it appears, some of this wool found its way to Bradford.

"For the successful manufacture of this wool we are indebted to the energy and enterprise of Mr. Titus Salt, who, in the application of this material to the making of cloth, has succeeded in laying the foundation of one of the largest manufacturing establishments in this country, and has conferred a blessing upon his own country, as well as the countries in which the animal is reared.

"The length of the hair of the alpaca renders it of considerable value for mixing with goat's wool, silk, and other materials. There are four forms of these animals, very distinct from each other—the Llama, the Alpaca, the Vicugna, and the Guanaco. The Vicugna yields very fine hair, which is very much valued, but the Alpaca yields the most useful hair.

"I have mentioned the advantage of acclimatising other animals. There would be no difficulty apparently in acclimatising these animals in Australia, though where they have been tried in this country, the rot has seized them, because of the tenderness of their feet. A few months ago, several Alpacas were secured, in spite of the jealousy of the Peruvian Government, somehow or another, and sent over to Australia, where they have arrived; and I understand that a first crop of wool has been secured, and that the flock is flourishing. Such experiments as these should be more extensively and systematically carried on, both in our country and in our colonies."

The alpacas were introduced into Australia by Mr. Charles Ledger. His brother has been kind enough to put into my hands some papers relative to this matter, and I trust that the particulars of this most important act of acclimatisation may be given to the public in the form of a book, for no one who has not read the history of these animals can have any idea of the immense difficulties, dangers from storm, pestilence, and famine—to say nothing of a very considerable loss of money—which this bold and enterprising man underwent to carry out a scheme which promises to be of the greatest importance to the most flourishing of our British colonies.

By the kindness of a friend in Paris, I am enabled to give, from an article, by M. Dupuis, in *La Patrie* of Sunday last, 25th November, a *résumé* of the animals, &c., now in the gardens of the Society at Paris, and learn that they now have, for the purposes of acclimatisation, examples of the following, viz.:—The hemione; a mule between this beast and an ass; pigs, from China; the pecory, from Brazil; the taper, from South America; a flock of llamas and alpacas, and of yaks, zebras, various kinds of antelopes and gazelles, goats, sheep, agoutes, and kangaroos.

BIRDS.

We have not all of us got parks or large farms, but there are thousands of persons who, as our poultry shows tell us, not only have accommodation for the rearing and preserving of birds, but also take great interest in their welfare. It is, therefore, part of my plan to point out what new and interesting birds, according to the experience of the Zoological Society, will breed, and are capable of acclimatisation in this country—many of them may almost be said to have been partially acclimatised—but still, I give as full a list as I have been able to get together, and in each instance I give the authority of the Zoological-gardens. I have not included the various foreign song-birds, which, however, might well be included in our category, as they afford occupation and amusement to many thousands of English men and women.

And first as regards the PHEASANTS, we must mention the CHEER (*Catreus wallichi*).—Being presented to her Majesty the Queen, it lived for several years in the Royal Gardens at Buckingham Palace, and there is, therefore, every prospect of the present birds doing well in the Society's establishment.

The MONAL (*Lophophorus impeyanus*).—The rich beauty of its plumage, its size, and the grotesqueness of its actions at particular periods, are equally remarkable; and when we add that it seems to be extremely apt to endure the conditions of confinement; that it breeds without difficulty under that disadvantage in this country; that it is perfectly capable of bearing the severest rigour of our winter, it certainly appears that the introduction of this mountain bird into the forests of Scotland is not only desirable, but ought ere long to be accomplished.*

The "Phasonus Versicolor," from Japan. The Torquatus, from China. It has been proved that both these birds will cross with our own pheasants, and produce hybrids of a greater size than either of the parents, and of a most beautiful plumage.

Continuing the pheasants. I am enabled, through the kindness of Mr. Leadbeater, to exhibit skins of the following beautiful birds:—

The PUCRASS (*Peucrasia Macrolophia*), the horned tra-

* Robert Hardwicke, 192, Piccadilly. Price, 1s.

* Mr. Gould has kindly lent beautiful skins of these two birds for exhibition, as well as of their hybrids with the common pheasant.

gophon (a most desirable species for breeding), the Kalege (*Euphrocomus albocercatus*), the Snow Partridge (*Tetroagallus Himalayensis*), all from the Himalayan range, and which would do well if we could procure them, and this is by no means impossible.

The Peacock Pheasant (*Polypliction chinguis*).—Two pairs were transmitted in 1857, from the aviaries of the Babu Rajendra Mullick, of Calcutta, and the species having bred more than once in the collection of the late Earl of Derby, it is extremely desirable that this loss should be replaced.

Then, we endeavour to purvey for the farm-yards; and, first on the list stand the Curassows, of which we learn that they number some dozen species, most of which have been proved to be capable of enduring the climate of England, with moderate protection; and some of them have reproduced, both at Knowsley and in the possession of the Zoological Society. The Dutch amateurs who flourished in the last century had so far acclimatised curassows in Holland, that they were not unfrequently brought to table; and, at the present time, several instances are known both of curassows and guans breeding freely in the neighbourhood of Paris.

Nor must we omit the Oscellated Turkey (*Meleagris oscellata*). Should a sufficient number of specimens be obtained, although it is certainly more delicate than the turkeys of Mexico and of the States, there is no reason to fear want of success in acclimatising it.

The Cuban Colin (*Ortyx cubensis*), the Welcome Colin (*Ortyx neoxenus*), the Californian Colin (*Callipepla Californea*).—These are all extremely prolific, and exceedingly disposed to reproduce in confinement; so that there will apparently be but little difficulty in acclimatising all those species which are indigenous to temperate regions.

The Californian colin is one of the most beautiful of the family, and is so naturally tame, that it has been known to breed freely in a cage, in the centre of Paris. It is perfectly hardy, and, as it is now becoming pretty numerous in collections, the day is probably not far distant when complete success will be attained in the experiment, which has been already commenced by a noble member of the Society to establish it as a game bird in this country.*

The Crested Guinea Fowl (*Numida crestata*)—I mention it in the hope that some further information, and other specimens may be obtained, by the notice of residents in West Africa being called to the bird, which would certainly make a very interesting addition to our poultry yards.

A most important bird next calls for notice, viz., the Brush Turkey or Talegalla, of which, by the kindness of Mr. Gould, I am enabled to show you a fine skin. I have not time to give any details of the interesting mound making habits of this Turkey, so aptly described by Mr. Gould, in his magnificent work on "The Birds of Australia." This bird has made its curious nest and reared its young in the Zoological Gardens.

Again, we have, as before-mentioned, the Gelinotte or Hazel Hen, of the Germans. This would breed and do well in many parts of England, particularly in Kent.

The Red-backed Parrakeet and Crested Grass Parakeet.—There is scarcely a doubt that all the species which inhabit the cooler parts of Australia would reproduce as certainly as those which are here mentioned, wherever space and congenial treatment can be afforded to them.

The Wonga Pigeon (*Leucosarica picata*).—Australia is rich in pigeons, not less than twenty-one species being figured in Mr. Gould's work. Of these the most desirable to acclimatise in Europe is the wonga-wonga, and the most graceful is the crested dove. The latter breeds very freely in confinement, when suitably accommodated. It is not only of considerable size, but, according to Mr. Gould's observation, a first-rate bird for the table, possessing a whiteness and delicacy of texture in its pectoral muscles, which are unapproached by any other species of this widely-spread and useful family.

The Crowned Pigeon (*Goura Coronata*).—These noble birds, although natives of New Guinea and its adjacent islands, not only bear the vicissitudes of our climate with the protection the aviary affords, but have almost every year re-produced in it.

And among water birds we find the following:—

The Pied Goose (*Anseranas melanoleuca*).—A pair of these birds bred in the Gardens (in the pond 29) for the first time in 1859, and successfully reared four strong young birds.

The White-faced Shieldrake (*Casarca cana*).—As she is perfectly hardy, having survived all the subsequent winters without protection, and has laid almost every season, it is very much to be regretted that we have hitherto been unable to obtain additional specimens.

The Red-billed Duck (*Pœcilonetta erythorhyncha*) breed pretty freely in confinement, and are very desirable additions, as they are perfectly hardy, and require no more attention than the ordinary waterfowl of Europe.

The Dusky Duck (*Anas obscura*).—It breeds without difficulty in a suitable locality, and might easily be established in any district where it could be preserved for the first few seasons.

The Summer Duck (*Aix sponsa*).—This beautiful duck is now well known in Europe, many hundred pairs having been imported from the United States, and almost as many bred on the ornamental waters of this country. Like its congener, the mandarin duck, it is arboreal in its habits, and not only builds its nest, but lives for a considerable part of its time in trees when in a state of nature.

The Ashy-headed Goose.—(*B. poliocephala.*)—Both of these species are of great beauty, and are derived from the extreme southern limit of the American continent. They are perfectly hardy, and as the ashy-headed goose has increased rapidly since its introduction at Knowsley, in 1849, there is little room to doubt that the Upland goose will also, in a few years, become equally abundant in European collections. The genus to which these birds belong is closely allied to *Bernicla*, which includes the well-known Brent goose and *Bernicle*. They are rather terrestrial than aquatic in their habits, feeding almost entirely upon grass, which they graze with the closeness of a flock of sheep.

The Sandwich Island Goose.—(*Bernicla Sandvicensis.*)—From these two pairs the whole of the birds now in European collections are descended.

The Cereopsis Goose.—(*Cereopsis novæ-hollandiæ.*)—It breeds almost every year in the garden, laying its eggs in March, next after the Sandwich Island goose, which is the earliest species we have.

The Bean Goose found now only wild in England, but might be easily domesticated.

The Rock or Magellanic Goose (*B. Magellanica*).

The Snow Goose (*Antarctica*), both from the Falkland Islands, and which would breed well here.

The Black Swan, of which Mr. Gurney writes to me:—"The pair in my possession, at Carshalton, breed regularly twice a year, sometimes three times, and have in six years had about 131 eggs, hatched 83, and reared about 50."

The Black Necked Swans which have reared their young in the Zoological Gardens.*

The Stanley Crane.—(*Tetrapteryx paradisea.*)—In the rich and varied collection of living animals which he subsequently accumulated at Knowsley, broods of this beautiful bird were hatched out on several occasions.

The White Stork.—(*Ciconia alba.*)—The white stork is one of the most familiarly-known species of European

* Mr. Bartlett speaks most highly of this bird; it is very lively game, and amusing, and breeds well. One hen of his last year laid thirty-nine eggs, and they were all hatched under bantam fowls except two or three.

* For the exhibition of the skins of many of these birds I am again indebted to Mr. Leadbeater.

birds, although in England it has, from the changes effected by improved agriculture, become comparatively rare.

The Mantchourian Crane.—(*Grus Montignesia.*)—The birds which were taken to Paris by M. de Montigny, on his return from China, in 1854, have not only flourished there in the most perfect health, but have for three successive seasons made a nest and hatched out their young. The Manchourian crane is a favourite bird among the Chinese, and I believe that a considerable number of them are always in captivity at Pekin.

The Australian Crane.—(*Grus Australasiana*).—It evinces great aptitude for domestication, and is called there "the native companion," from the docility with which it accommodates itself to the society of man. Lord Powerscourt does not confine his attention to mammalia alone. He also cultivates various kinds of birds, and the following is his list:—Pair of Polish swans; one black-necked ditto; one black ditto; one ruddy sheldrake; two ditto Mandarin ducks; one pair Carolina ducks; one ditto Bahama ducks (and a good many of other kinds); one pair spur-wing geese; one ditto Egyptian geese; two ditto grey-leg geese (and several other kinds).

There is a useful bird which may suit the tastes of some persons who have accommodation, and, I may add, wish for it; it is not very ornamental, but it is useful; I mean the Laughing Kingfisher (*Dacleo gigantea*) which may be taken as the type of a considerable group of kingfishers, which differ essentially in their habits from the lovely bird which flashes like a jewel along the brooks and rivulets of Europe. These powerful kingfishers of Australia seldom approach the water, but live in the dry scrub, and feed like birds of prey upon insects, reptiles, and small mammalia, instead of fish. The laughing kingfisher is excessively adroit in catching mice, and will wait as patiently as a cat at a hole whence he expects one to emerge. His note strangely resembles a rude powerful laugh, and the united efforts of the fine specimens confined in the aviary are heard far and near every morning. The regularity with which this laughter rings through the Australian forest at certain hours of the day, has not been unnoticed by the colonists, and among other trivial names for the bird, they have given it that of the "Settlers' Clock."

As among the mammalia, I have endeavoured to point out a quadruped which might again be restored to this country, so among birds I beg to suggest that there is no reason why an attempt should not be made to restore to those places where they once existed, that magnificent bird the bustard. He lived here once, and that in the memory of many persons now alive. Why should we not restore him (and I know where to obtain specimens), and place him in the preserves of Norfolk and on the plains of Salisbury? the old sport of coursing the bustard might again be revived, and the table might be supplied with a fresh delicacy.

We now come to another most important branch of acclimatisation.

Cultivation of the Waters.

No English dinner is complete without a dish of fish; and fish-diet is in itself most digestible and nourishing, particularly for invalids. There are indeed many races of men whose sole sustenance is fish. Again, consider the thousands of persons whose sustenance depends upon the capture of fish. It is marvellous to behold the fleets of fishing-boats that annually follow the herrings in their migration along our coasts, and to examine the financial returns of this fishery. With reference to fish-culture in the sea, we can do but little, except as regards one important fact, which was not long ago mooted in the *Times*, viz., the necessity of looking sharply after the size of the meshes of the nets, to prevent the destruction of the young fry, but if we cannot do much for fish, surely there are such things as what are commonly called shell fish; need I name the oyster and the muscle. As regards the oyster and the muscle, I have reference to several published facts to show that the cultivation of those articles of human food not only answers but even pays.

We then come to the cultivation of fresh-water fish, and this may be regarded in two points of view:—First, as regards the actual use of fish for food; secondly, as regards sport, and regulations for the anglers. Many persons laugh at the angler, and define him, according to Dr. Johnson's idea, as "a fool at one end, and a rod at the other;" but, mark you, we do not live in Dr. Johnson's time. Man's instinct for preying and destroying creatures, *feræ naturæ*, when unable to develop itself in fox-hunting or partridge-shooting, manifests itself in the love of angling.

This noble art has now reduced its maxims to a science. Hundreds of brains and hands are at work on this subject, whether it be fly-fishing or bottom-fishing; and in London alone there are fishing-tackle makers innumerable, whose business would cease to exist if they were not well-supported, and within the last few months a most important movement has taken place as regards the Thames, for by the exertions of the Thames Angling Preservation Society and their secretary, Mr. Farnell, the practice of netting has been abolished, and the fish are now protected from Kew-bridge to the City stone beyond Staines-bridge, and even higher up the river. I hear that netting is gradually becoming abolished. Besides this, by the kindness of the Duke of Rutland, the Right Hon. Sidney Herbert, and others, several trout and grayling have been introduced at various points of the river.

It is a happy provision of nature that there is a fish to be found adapted to almost every kind of water, from the lordly salmon of the mountain torrent to the humble eel of the stagnant ditch. Why should not we pay a little more attention to the habits of fish, and transfer fish suited for a certain kind of water into that water, supposing there to be none there already? Let us *study* the transport of fish, and utilize waters, whether great or small, which are now idle. The Dutchman does this; and he plants, so to speak, his canals with fish, and when the fruit is ripe he turns it into money. Were it otherwise, why should we find so many Dutch jack, perch, tench, and eels in Billingsgate Market, all commanding considerable prices?

Whether, therefore, we look upon fish as an article of food or as affording healthful sport at a cheap rate, it is necessary that we should look to the cultivation of the waters. I had here intended to quote a letter from Mr. Edward Wilson upon "utilising the waters," but I have not space for it. I do not wish to mutilate his admirable arguments. The best mode by which we can multiply fish is by the artificial reproduction of them, a mode long practised by the Chinese, and of late in several parts of England. Many may be inclined to laugh at the idea of hatching fish, but I beg to put forward an answer to them, which of all answers is the best—viz., that if properly carried out "fish-hatching will pay." Mr. Wilson tells us that "the annual value of salmon alone to Scotland is no less than £800,000 per annum, and to Ireland £300,000. With proper care of the young fish there is no reason why this large sum should not in time be doubled." I have lately visited the salmon-hatching ponds at Stormonfield, near Perth, and was surprised at the facility with which this process is carried out. This process is also going on at Lake Bearport, and other places in Canada. I have also an account of "The French Piscicultural establishment at Huninge, near Basle," by Mr. Thomas Ashworth, which is supplied by the water of the Rhine, and no less than five kinds of fish are principally cultivated—viz., salmon, trout, ombre, chevalier, and Danube salmon. From this establishment the fish are sent all over France, and will in time produce great national results.

We have all of us heard of the attempts made to introduce salmon into Australia; within the last few months a sum of no less than £600 has been spent upon the object; it has unfortunately failed, but Mr. Lloyd, the aqua-

rium dealer, of Portland-road, who has studied the subject of the transport of fish scientifically, says he is convinced that young salmon, if properly and scientifically watched during their long voyage, would arrive in safety.

There are many persons living who can recollect salmon being caught in the river Thames, and not many days ago a spawning fish was caught at Erith. We hail the appearance of this fish with glee. If one comes why not more. Why should not we assist nature, and hatch salmon artificially on the chance of restoring them to the Thames, though I myself, in common with several other persons, am sanguine enough to believe that we have more than a chance of restoring this noble fish to our beautiful river. Efforts are at this moment at work to obtain from the salmon spawning beds at Perth ova for the purpose of stocking other rivers, but I regret much to say that the Tay Commissioners have refused applications for the salmon ova, a fatal mistake. By giving them they would in reality lose no more than a person who gives a light to another from his burning candle; and by not allowing them to be taken they derive no advantage to their fishery, for a gentleman from Perth writes to me "at present we have salmon spawning in one ford from which as many ova are destroyed by trouts as would supply all that is wanted, and would no more impoverish the river than giving a handful of grain out of a granary full of corn." I trust the Tay Commissioners will withdraw their refusals of ova, and assist, not endeavour to arrest, the progress of pisciculture.

Of the science required for the raising fishes for the stocking of home waters, thus speaks Sir Humphrey Davy, in his delightful work *Salmonica*:—"The result is easily attained, and the difficulties are quite imaginary. The impregnation of the ova of fishes is performed out of the body, and it is only necessary to pour the seminal fluid from the milt upon the ova in water. Mr. Jacobi, a German gentleman, who made many years ago experiments on the increase of trout and salmon, informs us that the ova and milt of mature fish, recently dead, will produce living offspring. His plan for raising trout from the egg was a very simple one. He had a box made, with a small wire grating at one end in the cover, for admitting water from a fresh source or spring, and at the other end of the side of the box there were a number of holes, to allow the exit of the water; the bottom of the box was filled with pebbles and gravel of different sizes, which was kept covered with water that was always in motion. In November or the beginning of December, when the trout were in full maturity for spawning, and collected in the rivers for this purpose upon the beds of gravel, he caught the males and females in a net, and by pressure of his hands received the ova in a basin of water, and suffered the milt or seminal fluid to pass into the basin, and after they had remained a few minutes together, he introduced them upon the gravel in the box, which was placed under a source of fresh, cool, and pure water. In a few weeks the eggs burst, and the box was filled with an immense number of young trout, which had a small bag attached to the lower part of their body, containing a part of the yolk of the egg, which was still their nourishment. In this state they were easily carried from place to place, in confined portions of fresh water, for some days requiring apparently no food; but after a week the nourishment in their bag being exhausted, they began to seek their food in water and rapidly increased in size. As I have said before, Mr. Jacobi assures us that the experiment succeeded as well with mature fish that had been killed for the purpose of procuring the roe and the milt, these having been mixed together in cold water immediately after they were taken out of the body. I have had this experiment tried twice," continues Sir Humphrey, speaking in his own person, "and with perfect success, and it offers a very good mode of increasing to any extent the quantity of trout in rivers or lakes, for the young ones are preserved from the attacks of fishes and other voracious animals or insects, at the time when they are most easily destroyed and perfectly helpless. The same plan, I have no doubt, would answer equally well with grayling and other varieties of the salmo genus. But in all experiments of this kind, the great principle is to have a constant current of fresh and aërated water running over the eggs."

What has been said of Canada by Mr. F. Forrester, in his "Fish and Fishing" (Bentley, 1849), will equally apply to many parts of this country.

There are thousands and tens of thousands of little tumbling transparent rills throughout this country—scarcely a farm without a dozen such—which have numerous natural basins in their courses, each of which, with the aid of a few hours' work employed in raising a timber dam, and applying a grate at the entrance and egress of the stream, would constitute as perfect a store-pond for the making of such experiments as could be erected by the wealth of Crœsus; with the advantage, too, of having the fish requisite for the tests existing, in a state of nature, within a few miles, perhaps within a few hundred yards, of the scene of action.* As an example of what has been done by the simplest possible apparatus, I would instance the introduction of the grayling into the Clyde by the Angling Club of Glasgow. In the *Field* of last Saturday, Nov. 24, is a description and also a plan of the process. Within the last few weeks, I have pointed out the advantages of pisciculture to a friend who has facilities, and who is at this moment engaged in laudable endeavours to hatch trout near Canterbury.

But we must not flatter ourselves that we are altogether about to introduce pisciculture as a novelty into this country.

In former days, when the inhabitants of this country were for the most part Roman Catholics, and, therefore, great eaters of fish, the cultivation of fish was looked after; and I would quote a good authority on this point:—

"That carp were introduced from the Continent to England by the monks is nearly certain; this, however, could be accomplished without recourse to any artificial modes of procuring or raising the young fry. There are, however, many and powerful reasons for believing that the grayling, the charr, the gwyniad, and perhaps also the vendace, the pollan, and the powan, were also introduced by the same agency from foreign countries. This belief is supported by the fact that these fish exist only in isolated and often distant waters, sometimes in only one or two neighbouring rivers, whereof that which contains them is apparently the least adapted to their habits, but always in such waters as had many or distinguished monastic institutions on their banks. While England was Catholic, great attention was paid to the raising and fattening of the choicest varieties of fresh-water fish, an art which sunk into neglect, partly owing, doubtless, to the abolition of fast-days, and partly to the great facility with which the finest sea-fish are now transported throughout the country.

"Even to this day, in Austria, Illyria, and parts of the Tyrol, the greatest attention is paid to the nurture of the most delicate fresh-water fishes in confined situations; and Sir Humphrey Davy states, in his *Salmonica*, that, 'at Admondt, in Styria, attached to the magnificent monastery of that name, are abundant ponds and reservoirs for every species of fresh-water fish, and the charr, grayling, and trout are preserved in different waters, covered, enclosed, and under lock and key.'"

There is no reason why we should be behind our ancestors in this matter, therefore let us set to work and see what is to be done.†

* As it is impossible to go very much into the subject, I have given a list of books relating to the art of Pisciculture:—"Book of the Salmon," in two parts, by Ephemera (Longman and Brown, 1850); "La Pisciculture et la Production des Sangsues, par Jourdier" (Hachette et Co., Paris, 1856); "A Treatise on the Propagation of Salmon and other Fish, Ashworth, (Simpkin and Marshall, 1853); "On Pisciculture," W. H. Fry, New York (to be obtained of the publisher, at 36, Soho square); and the two works of Boccius (Van Voorst, Paternoster-row).

† I have received information from Mr. Lloyd, of Portland-road, that in the hot summer of 1859, he sent out to the Cape

As regards insects and plants I have somewhat to say, but my limits will not allow me more space than to state that there exist many specimens of both; to instance in the one class the Ligurian bee, which Mr. Tegetmeier, secretary of the Apiarian Society, has already partially succeeded in acclimatizing. By the kindness of this gentleman I am enabled to show specimens of the bee. He gives it a most excellent character; it would be a great adjunct to our farm economy. As regards plants I have much to say, but I dare not break into this subject, which would require an evening to itself; suffice it to say, that there is an immense opening for the introduction of plants that would prove to be of the greatest use both to the poor and the rich.

I have now taken a hasty and summary survey of the animal kingdom, and have presented to your notice what facts I have been able to obtain relative to various beasts, birds, fishes, &c., which are capable of acclimatisation. We have space and means, and food for many of them in our own favoured island; we know where they are, we can get them with interest, labour, and money, and when they arrive here we have, I am convinced, and actually know, many who will take charge of them. We, as Englishmen, are particularly lucky as to our chances of obtaining them. It is said the sun never sets upon the possessions of our most gracious Queen. English vessels are sailing daily to and from our colonies. Let us establish a system of interchange, receiving in return that which will be advantageous to us at home; for up to this time this country has been acting on the principle of "all give and no take;" we export thousands of our best living productions—how few do we import. We have all the crude materials provided by Nature herself; for an extensive scheme of acclimatization at hand, all we want is the interference of man, who shall apply energy and capital.

How then is this great object to be carried out. Individuals are comparatively powerless, but by means of a union of efforts, in the shape of a society, something might be done; at all events it is well worth a trial. The idea, therefore, having been started, took a tangible shape but a few months ago. The intelligent proprietor of the *Field* newspaper (a journal which opens its columns to the encouragement of that talent of observation and love of natural objects which we all of us instinctively possess), Mr. John Crockford, the Hon. Grantley Berkeley, and myself, held a consultation as to whether it was not possible to direct into one channel the many facts relating to the subject of acclimatization which were floating about, little heeded.

The Hon. Grantley Berkeley, as is well-known, is a gentlemen who has devoted much of his life to the active pursuit of field sports, and during a long course of years he has devoted his attention, not solely to the *destruction* of animal life, but also to the accurate observation of facts relating to the creatures' natural habits and instincts—I may say social economy. This gentleman has kindly used his influence in obtaining the support of many noblemen and gentlemen, who have means and space for the work of acclimatisation, and I am now able to present a long list of noble patrons, which, indeed, gives us great hope of ultimate success.

Added to this, Mr. Crockford most liberally gave us all the assistance he could afford by means of the press; and as for myself I have used, and hope always shall use my best energies, not only in starting, but also in keeping going the first public attempts at Acclimatisation in England.

It was therefore determined to start at once a Society for the Acclimatisation of Animals, and we held the first meeting on June 10, 1860. We have on our Council men who are willing to devote their energies to the object. We have for Vice-President the Hon. Grantley Berkeley, and as Secretary your most obedient servant. Our plans are based upon those of the Société d'Acclimatation, and I have ventured to put forth the following programme, to show what are our plans of operation:—

The purposes of the society are—

1. The introduction, acclimatisation, and domestication of all innoxious animals, birds, fishes, insects and vegetables, whether useful or ornamental.

2. The perfection, propagation, and *hybridisation* of races newly introduced or already domesticated.

3. The spread of indigenous animals, &c., from parts of the United Kingdom where they are already known, to other localities where they are not known.

4. The procuration, whether by purchase, gift, or exchange, of animals, &c., from British and foreign countries.

5. The transmission of animals, &c., from England to her Colonies and foreign parts, in exchange for others sent thence to the society.

6. The holding of periodical meetings, and the publication of reports and transactions for the purpose of spreading knowledge of acclimatisation, and inquiry into the causes of success or failure.

The society will begin with small and carefully conducted experiments.

It is proposed that those members who happen to have facilities on their estates for experiments, and who are willing to aid the objects of the society, should undertake the charge of such subjects for experiments as may be offered to them by the society, periodically reporting progress to the council.

It will be the endeavour of the society to attempt to acclimatise and cultivate those animals, birds, &c., which will be useful and suitable to the park, the moorland, the plain, the woodland, the farm, the poultry-yard, as well as those which will increase the resources of our sea-shores, rivers, ponds, and gardens.

It his hoped that this endeavour to increase the internal resources of the country will meet with the support of the public.

Persons desirous of becoming members may do so on subscribing £2 2s. per annum. A donation of £10 will make the donor a life-member of the society.*

The Society thus formed have had several meetings, and discussed several points; they have obtained promises of support and co-operation from many persons who are interested in the subject. Among others who attended the meetings was Mr. Edward Wilson, whose name is so well known in connection with the operations and successful efforts he has so nobly made to acclimatise animals in Australia. This gentleman addressed a most powerful letter to the *Times*, (which I regret I have not space to print in full,) whereby he raised the public mind to the importance of acclimatisation, and did an essential service.

Shortly after this letter appeared in the *Times*, at a meeting held October 6, 1860, Mr. Wilson announced publicly that Miss Burdett Coutts, with that generosity and kindness of heart which has gained for her the respect and esteem of all classes, both rich and poor, had presented the Society with the munificent donation of £500, together with a promise of subscription of £10 annually for five years. Thus did this excellent lady stretch out the hand of encouragement towards those who were endeavouring to do good in their generation, and we may now state that "The Society for the Acclimatisation of Animals" is fairly on foot, and the Council are willing to undertake such steps as shall be most advisable, in opening the active operations in a field new and unexplored. We are as yet young, and amid the *embarras des richesses* we feel it difficult to know how to begin.

In his letter to the *Times*, Mr. Wilson stated that a great want in this country was a domestic animal not too

of Good Hope a quantity of carp and tench, that he delivered 75 per cent of them alive, and that they have since multiplied amazingly. He is about to send out some trout to the Cape.

* Temporary Offices, 346, Strand.

large to be consumed by a middle-class family, and the flesh of which should be meaty rather than poultry like. Our sheep are too large for this purpose ; pork is not wholesome if used too frequently or killed too young; and rabbits are too small, flavourless, and white-meated.

For the new animal the wombat was suggested, a rodent which burrows in the earth, feeds by night, and has flesh which affords excellent eating. It abounds in districts of Australia.

Here, then, is an animal which might be tried, but I fear there would be some difficulty in getting it generally adopted as an article of food, for prejudice would be in the way.

It remained, therefore, for us to cast about and see what sheep we could find which would come up to the necessary requirements. I shortly afterwards received a letter from Dr. Gardner, mentioning a sheep which would answer the purpose, viz., the Purick sheep, which is found in the districts of the Himalaya. Long correspondence ensued about this sheep, as well as other small kinds of sheep, which were to be procured in different parts of the world. At length I heard of a small sheep which had been imported from Brittany by Mr. Baker, of the Pheasantry, Beaufort-street, Chelsea. Whether this be the Purick sheep of Dr. Gardner or not I am not aware ; anyhow, I show it alive this evening, that persons may judge for themselves of the advisability of endeavouring to make this sheep, or a sheep like it in size, &c., general in this country. It is certainly a very little beast to begin our acclimatising efforts with, but I look at it in the light of the proverbial "small end of the wedge." The habits of this animal are exceedingly hardy ; it lives in a wild, barren place, and I should suggest its adoption by persons who have a lawn or grass plat, or still better by cottagers, who could turn it out to live on the grass which grows about our hedges and ditches, and which is often wasted by not being grazed down.*

The second point the Society intend to commence with is—the introduction of game birds. The Hon. Grantley Berkeley, in his wanderings on the prairies of America, was much struck with the advisability of endeavouring to acclimatise in this country the prairie grouse and the tree grouse of America (of which I now show specimens, and relative to which I have much information). This gentleman became acquainted with several persons who are willing to aid him by sending over these birds, and also some specimens of American deer. Captain Hardy, of the Royal Artillery, has kindly promised to send us over from Halifax, where he is now quartered, not only living grouse but also their eggs, relative to the transport of which for long distances I have again many valuable hints from practical men.

Thus we have endeavoured to select, as opportunity afforded us (for we are not yet rich enough to choose), a specimen of a beast and a bird. It only remains now to find a fish which shall take the place and become a useful pond fish, and we have, I believe, found a fish, the "Lucid Perca" or the "Sander" (of which I show a drawing the natural size). From all evidence we have received, this appears to be the fish we wanted. We want to get him over here, and I am in the track to do so by means of an apparatus kindly lent us by Mr. Wilson; and when he arrives here, I know a gentleman who has kindly offered to receive him and treat him with all the deference due to such a distinguished (and we trust also useful) foreigner.

One of our objects, as you see from the programme, is to collect information. All information is valuable, for it prevents action in false directions, and suggests plans. We have been fortunate enough to receive correspondence from many parts of the world, and not only correspondence but actual co-operation, for, in September last, the Society sent, by invitation, a deputation to Glasgow. A meeting was held, the Lord Provost in the chair, the result being, that there has been formed by the enlightened citizens of this noble town, a Scottish branch of the London Acclimatisation Society; and thanks to them for their cordial reception and assistance.

I wish, in this place, to state publicly, once for all, that the Society just formed is by no means desirous to run counter, or be set up in opposition to, the Zoological Society of London. The Council, on the contrary, trust that they shall obtain their co-operation and support, inasmuch as the point aimed at by them will be to carry out measures in full which are not insisted upon by that highly scientific body of men.

Again, I feel convinced that, as time goes on, the Government of this country will be convinced of the national importance of Acclimatisation. But lately the subject of the systematic interchange of the natural productions of the British dependencies was brought under the notice of the Colonial Office by the Earl of Carnarvon, and his Grace the Duke of Newcastle replied that it had been in his power to render some service to the cause by writing to the governors of several of our colonies, but that anything like a vote of public money was inexpedient.* In his letter to the *Times*, Mr. Wilson asks:—"Is your Government right, while surrounded by fifty-five colonies of unknown capacities, to leave everything to private enterprise; and, if private enterprise fails, to allow the noblest undertakings to rest, comparatively untested by any effort whatever." Let us do our best, and rely that the Government will, sooner or later, recognise our exertions, and help us in our endeavours for the public good.

I have now performed my task (inadequately, I fear), of putting before this Society some few facts relative to the Acclimatisation of animals, and I trust that I have succeeded in making it appear that this is a subject the details of which are not only highly interesting, but can be carried out with the prospect of great and most important results. Much, nevertheless, will depend upon individual exertion and support, and I here beg to appeal to all those who can (and there are many who have the opportunities) to help us as much as they can. Mr. Mitchell, with an encouraging tone, writes:—"If a hundred of our great proprietors would each give up the necessary space and money to cultivate one single species, no matter of how great or how little importance, the result in twenty years would infinitely surpass all that could ever have been done by so miscellaneous and comparatively unmanageable assemblage as that marvellous collection of Lord Derby's, of which we speak with affection and regret."

Again, a writer in the *Saturday Review*, April 14, 1860, most justly says:—"When we consider the enormous influence produced upon the history of mankind by the sheep, the horse, the dog, and others of our domesticated animals—formerly, without doubt, existing in a state of nature, and reclaimed from it by the agency of man—who can deny that results, if not equally great, yet of the utmost importance to the human race, may follow from additions yet to be made to the list? It would be strange indeed if, out of the numerous species now known to science to choose from, and with all the experience of modern civilization, we were altogether to fail in selecting some with constitutions sufficiently pliable to be moulded into races subservient to the use and profit of mankind. It is true that the importance of the animals recently added to our domestic stock is not great, and their number insignificant. But this, perhaps, is as much attributable to the *little attention* that has been paid to the subject as to any supposed exhaustion of the series of 'acclimatizable' animals."

I do not wish it for a moment to be supposed that I

* As regards sheep, I would also mention that we intend to pay attention to animals which are likely to effect improvements in wool, but as the subject has been so admirably treated by Professor Owen in his lecture on the raw materials from the animal kingdom, in the Great Exhibition, given in this theatre December 10, 1851, and also by Mr. Leonard Wray, in the *Journal of the Society of Arts*, Vol. VIII., No. 377, Feb 10, 1860, it would be presumption in me to touch upon the subject.

* See Mr. Wilson's letter to the *Times*, for Sept. 22nd, 1860.

am sanguine or enthusiastic enough to imagine that a quarter or even a third of the animals, &c., will ever be acclimatized or made useful in this country, or, that the Society established for this purpose will be able to make a very large gap in the 140,000 animals mentioned in M. Geoffroy Saint Hilaire's list, but as I have to treat on a subject as a whole, I should be failing in my duty if, to a large and highly educated audience, I did not endeavour to lift up the veil which secures that great panorama with which we are everywhere surrounded, to point out with the rod of experience those living creatures which actual experiment had positively proved and demonstrated could live and multiply their species in our own favoured land, or to suggest several foreign creatures that might, and would most probably live, if conditions were made by the hand of man suitable to their welfare.

My object has been to show what a wide field is now open for public as well as individual exertions, and how much is left unheeded which ought to be cared for. I have cast my bread upon the waters, in hopes that time will lead to the most important national results, and that we may live, one and all of us, to carry out as far as in us lies, that great command which was given to our first parents, and from them to ourselves, by the great Creator himself, to have "dominion over the fish of the sea and over the fowl of the air, and over every living thing that moveth upon the earth."

DISCUSSION.

The Chairman said it was now his duty to invite discussion upon the very comprehensive and highly interesting paper they had heard from his young scientific friend, the son of his oldest and best scientific friend. He should be happy to hear any remarks which would tend to the better ventilation of this great and useful subject, which in his opinion constituted one of the most practical parts of natural history.

Mr. Chief Justice Temple, having expressed the pleasure with which he had listened to the paper, said Mr. Buckland had, by the amusing manner in which he had treated the extensive subject now brought under their notice, sweetened the edges of the chalice of instruction, and had presented knowledge to them in its most delightful garb. The acclimatisation of animals and vegetables was a subject of the highest importance, and the establishment in this country of a society with that object in view was entitled to every support and encouragement. Without acclimatisation what would Great Britain be at the present moment? How meagre would be the necessaries, and how absolutely *nil* would be the luxuries of life! It was true that, without the aid of such a society, the natural as well as the adventitious wants of man would always prompt individual efforts to introduce into this country animals and vegetables indigenous to other countries, and to naturalise them here. Much had been already done. There was little doubt that our ancestors, though they had beasts of the chace—the wild bear, the fox, the wolf, and probably the deer also—yet had very few of those animals which at present administer to our daily wants. The field, however, notwithstanding great individual exertions, was still very wide; there was yet a great deal more to be done, and they must look to an acclimatisation society to aid individual efforts to enhance the comforts and increase the happiness of man. If they looked abroad in the world, not only in this country did they find animals which centuries ago had no existence here, but in other countries also there were animals in great abundance, which, when these countries were first discovered, had no existence there. There were at present no doubt hundreds and thousands of animals which might, he thought, be very easily introduced into this country and naturalised. Some of them perhaps might not entirely succeed, but he thought it was incumbent upon a society such as Mr. Buckland had alluded to, to try the experiment. If in one case the experiment failed let them try others, and there could be no doubt that in the end they would succeed in introducing a great number of animals which would add greatly to the pleasures of the table and to the comforts of life. In introducing any new animal into this country, of the qualities and characteristics of which they were ignorant, they would doubtless encounter considerable prejudice. If they placed a new dish on the table the company would look at it with suspicion, and it would perhaps be rejected without having been tasted; but he thought in such a case as that the Attorney-General would be justified in doing as he had done in a recent well-known instance, applying to the Court of Queen's Bench for a writ *ad melius inquirendum*, and, notwithstanding it might be pleaded that the inquiry had taken place *super visum corporis*, the application would no doubt be granted, because the body had been viewed without having been tasted. There was a little animal which they frequently saw in Museums, and in the Gardens of the Zoological Society, called the armadillo, well-known in the country where he had held an official position for many years, British Honduras. Were he to recommend the eating of this animal to an epicure, probably from the bad company he had seen it in, he would feel disgusted; but if he placed it before him well roasted, well stuffed, and accompanied by a savoury gravy, he had no doubt it would be pronounced a most estimable dish. This animal burrowed in the earth, and fed upon roots and other vegetable products. It was most cleanly in its habits, and in that country it was esteemed one of the greatest delicacies of the table. He had frequently eaten it. Its flesh was perfectly white, delicate, and juicy; and he was certain, if introduced here, it would be considered a great delicacy. There were also in that country other burrowing animals which were very delicious. In alluding to many of the specimens which Mr. Buckland had introduced to their notice, that gentleman had laid some stress upon their being good eating. He was quite right in doing so, because there was no doubt that the value of animals was, after all, not so much on account of their beauty as their capability of adding to the comforts and pleasures of life. He was sure, from the highly successful experiment that had been tried with the eland, they ought to be stimulated to further efforts to introduce into this country other animals of a similar kind. The flesh of the gibonet was white and delicate, and did not differ much from that of the armadillo. It was a very singular fact that the flesh of almost all animals found in tropical climates was white; perhaps the learned professor in the chair would be able to give them some information to account for that circumstance. Another animal found in Honduras, which he believed might be successfully introduced into this country, was the Indian rabbit. It however bore no resemblance to the rabbit except in its habits. Its mode of eating was very different. The flesh of that animal was also perfectly white, short-eating, and delicate, but it was not fat. In fact an extraordinary peculiarity of the animals found in tropical climates was an absence of all fat, and he could account for it in no other way than attributing it to the constant annoyance to which such animals were exposed in those climates from the musquitoes, red ants, and other insects to whose attacks they were incessantly subjected. A great deal had been said and much information given respecting the varieties of the deer tribe, and they had heard a charming description of the wapiti. In Honduras there were two kinds of deer. The red deer, which was almost as large as the red deer of Scotland, but the flavour was very different. He had not tasted the red deer of Scotland, but he had been told it was dry and stringy. The red deer of Honduras was rather dry eating, but was not stringy, but short, like most of the game in that country. There was also the fawn-coloured deer, a very beautiful animal, the flesh of which was also perfectly white. The antelope also abounded in Honduras. It was a small but very beautiful

animal, which he thought could easily be introduced into this country. It would not only be a valuable addition to our table delicacies, but also an ornament to our parks. Of birds there was a large variety in Honduras. That which was first deserving of notice was the curassow, two specimens of which were exhibited. These birds, when cooked, were of similar flavour to the moor-cock of Scotland, and there was upon the breast a layer of white and a layer of brown flesh. There was also the guan, which he had brought from Honduras. He saw no reason why both those birds should not be naturalised in this country. They mixed well with the other poultry in the yards, and were easily domesticated, and in Holland he had been told they had reproduced. The Honduras pheasant was another bird which he believed might be successfully introduced. It, however, bore no resemblance to the pheasant of this country, in size, plumage, or flavour; but it was capable of being easily domesticated, and he thought there would not be the least difficulty in naturalising it. There were many varieties of pigeons in Honduras. One species—the mountain pigeon—was a large bird, with a beautiful purple and golden plumage. The flavour was similar to that of the common partridge; but how far the flavour would be altered upon the introduction of those birds into this country he could not say, or whether the flavour depended upon the character of the food they ate. Mr. Temple then called attention to specimens which he exhibited of the black-boned fowl, respecting which some controversy had taken place. Those birds, he said, he had succeeded in completely domesticating on his own premises at Honduras, and those which he had brought over to this country and given to the Zoological Gardens had brought up several broods of young. He believed, if these were killed, their bones would be found to be black like those reared in Honduras; but he could not say to what depth into the bone that colour penetrated, or whether it was more than a covering to the exterior of the bone. Mr. Temple concluded by expressing a hope that, at some future time, he might be able to give some aid to so valuable an institution as the Acclimatisation Society, to which he wished every success.

The CHAIRMAN said Mr. Buckland had evidently obtained a most valuable recruit in the last speaker. Respecting the important subject of the propagation of salmon in other countries—particularly its transport to such of our colonies as had rivers suitable—he regretted that Dr. Milligan did not appear to be present, or he would have asked him to give them some information on that subject.

Dr. CRISP thought they had to look to the really useful and practical part of the question. It resolved itself into the ornamental and the useful. All the animals mentioned by Mr. Buckland were for the delectation of the higher classes. What he wished to look to was the introduction of animals which would be useful to the community at large. They had an increasing population, and the extensive plains and commons which those animals would inhabit were gradually disappearing, and were being appropriated to agricultural purposes; therefore it was useless to think of introducing these large animals to be kept in their wild state. He should very much like to see some of the animals spoken of ranging in parks and meadows, but he questioned whether anyone present would venture to intrude his person where there was a herd of elands at liberty. With regard to that animal if had struck him that the horns might be removed when the animal was young, and it might be used for agricultural purposes. There was one matter connected with the subject which ought to be borne in mind; that was, in studying the physical structure of animals, he had noticed that the Almighty had placed them in localities and climates suited to their conformation. If they wanted an illustration of that, let them look at the Suffolk breed of cart-horses, which if taken to Scotland, in a few years degenerated. Numerous instances of the same kind might be adduced with regard to sheep, so that even in our own limited country they found that certain breeds of animals throve best in particular localities, and if taken to other localities they degenerated. Then what had already been the experience with regard to the introduction of foreign beasts and birds? There were sportsmen present who he believed would give their opinion that it would have been well if the French partridge had never been introduced into this country. A number of those birds were placed upon the estate of the Marquis of Hertford, in Suffolk, about 40 years ago, and they were to be found in nine or ten other counties; but he believed the opinion of sportsmen to be that they destroyed the grey partridge, spoiled the dogs, and were generally disliked as objects of sport. Then came the question with regard to the curassow. That bird was originally introduced upon the same estate, but they all died from various causes, and the same was the case with regard to the golden pheasant; so that although he agreed with Mr. Buckland as to the great importance of the subject, and although he believed the Acclimatisation Society was likely to be of immense benefit, yet he thought they must look at this matter in a more practical and utilitarian point of view, and they must not be too sanguine as to the results.

Mr. MCKINNON said he should be wanting in his duty, in the absence of Dr. Milligan, not to give such particulars as he possessed with regard to the introduction of salmon into Australia. He had acted as hon. secretary to the Australian Association of London, which had been formed for the purpose of considering questions of interest to that colony. In the first attempt that was made to introduce the salmon into Australia the expense was borne by private individuals interested in the colony, and the enterprise was entrusted to Capt. Black, who was requested, by the Government of Tasmania, to investigate the rivers and report upon their suitableness for salmon. The report of Captain Black was so favourable to the project that a committee of the colonial legislature was appointed for the purpose of inquiring into the subject, when they reported, as their opinion, that the Colonial Government should place a sufficient sum of money at the disposal of the Australian Association in London for the purpose of making experiments upon this matter; and by the last mail he (Mr. McKinnon) received the intelligence that a sum of £1,725 had been placed at the disposal of the association for that purpose. Upon the receipt of that communication a meeting of the association was held, at which the subject was discussed; but they felt, in the absence of Dr. Milligan and other gentlemen, that none of the members had sufficient experience and knowledge of the subject to justify them in entering upon the experiments, and they decided to suspend the operations until the winter of 1861-2; and they solicited the assistance of practical men to enable them to enter upon their labours next year with a better hope of carrying out the project to a successful issue. Mr. Lloyd had been requested to collect all the information he was able to do, and he hoped many other gentlemen would feel sufficiently interested in the subject, and would give the association the benefit of their knowledge and experience. It was his intention to propose a premium for an essay on the subject. It was well understood that nothing was easier than the rearing of salmon from ova when once on shore; but the difficulty was the sending the ova in ships, which were tossed about and passed through such variable temperatures. These were matters which had to be looked into and provided against before any fresh experiments were entered upon.

The CHAIRMAN was happy to see that they were favoured with the presence of Mr. Crawford, the late governor of Singapore, a country to which we were indebted for many beautiful animals now in England. He should be glad to hear any observations from that gentleman.

Mr. CRAWFORD, responding to the call, said he was compelled to differ to a considerable degree from some of the premises laid down by his friend Mr. Buckland. He begged

to say that the number capable of being domesticated, both of the feathered tribes and mammalia, was very small. There were nine species of the horse family, and they had never succeeded in domesticating more than two of them, viz., the ass and the common horse. There were, he believed, 300 species of pigeon, and there was but one which had ever been domesticated, and that was the common blue rock pigeon, which existed in every part of the world he had been in. With respect to the deer and the antelope, he had eaten the flesh of both those animals, and he assured them the Indian deer was very bad food. He had never eaten good venison out of England —not even in his own country—Scotland. The fallow-deer beat all the others. The red-deer was very high-flavoured, but it was never fat, and they were obliged to add the fat of mutton to it to make it tolerable at table. Besides that, where was the room for all these animals if they could domesticate them? The deer of this country were kept as luxuries, and were only to be seen in the parks of gentlemen, from whence only they found their way into the market, and were sold at a very high price. Something had been said about the alpaca. He understood Mr. Buckland to say that that animal was not suitable for this country, though it was for Australia. He (Mr. Crawford) was of a different opinion. The alpaca was a native of high mountains, and there were no high mountains in Australia, at least they were not more than one-fourth the height of the Himalayas. The alpaca was, by the anatomical structure of its foot, fit for high mountains, and nothing else. It was but a poor beast of burden, and not at all a beast of draught. It was true the wool was of double the value of common sheep's wool, and they had from three to four millions of pounds annually imported from Peru. He found that the camel had been introduced into Australia. Now, the camel was eminently a beast for desert and barbarous countries; no country having good roads would have camels, and they could never succeed in Australia as a domestic animal. In such a country, the donkey was a more useful animal than the camel. Four donkeys would carry the same burden as a camel, and a donkey would live without water as long as a camel. The camel was a delicate animal in its constitution, and as many as 20,000 of those animals perished in the Affghan war. With regard to the introduction of salmon into Australia, he had a strong impression that it would never succeed. Did any one ever hear of salmon in the southern hemisphere, or within the latitude of 40 degrees? Far north, they were very abundant. It was a creature of a cold climate, or at all events of a temperate one, and was nowhere to be found in the tropics. Australia was in latitude from 30 to 40 degrees. There was no salmon in the Mediterranean, although they might have expected to find it there; and if it did not exist there, how could it be propagated in Australia?

Mr. Boccius agreed with Mr. McKinnon, that salmon might be successfully introduced into Tasmania in rivers whose waters were chiefly supplied from the mountain streams, but the main point was the safe conveyance of the ova to that country. In 1852 Earl Grey, then Secretary of State for the Colonies, directed him to give his attention to the sending of salmon over to Australia. He obtained the spawn, but, unfortunately, the vessel by which it was sent was detained thirty days in London after it was taken on board, and afterwards lay for seven days in the Downs, so that the salmon were bred out on this side of the equator. If that detention of the vessel had not occurred, the fish would have been bred on the other side of the line, and in that case he believed they could have been carried to Tasmania. He would further remark that, notwithstanding the rivers of the east and south-western parts of this country had become comparatively barren of salmon through the large extent of fishing, yet by proper protection of the spawn, any stream in this kingdom could be re-stocked in the short space of two years. A salmon of 10 or 15lbs. weight was capable of reproducing 15,000 fish; within two years these fish would be capable of reproducing to the like extent; and if due protection was given to the fisheries, what an enormous quantity of food could be obtained from our rivers! With regard to the management of fish ponds, he had published a treatise upon that subject, from experience he had gained in Germany. There was not a stream of water in this country which was not adapted for the propagation of salmon. Tidal streams were the best, for the salmon went to the estuary to feed; and after 15 months old the salmon never fed when they returned to the natural waters in which they were bred. The consequence was they might breed these fish to an unlimited extent, and they did not in any way interfere with the stock of the other description of fish in the river.

Mr. Tegetmeier, being called upon by the Chairman, mentioned that the Ligurian bee, spoken of by Mr. Buckland, had attracted considerable attention amongst the German apiarians, and it had been successfully introduced into that country. It was distinguished from the ordinary bee of this country by the yellow rings round its body, which were black in the common species. It was regarded as superior to the common bee, and collected food in more unfavourable weather, besides being hardier and less irascible, and the queens were more prolific than those of the common bee. These were deemed to be advantages. They had been joined on to the stock of common bees, and were now working very successfully. The species had been disseminated by the artificial rearing of queens. In addition to their value in an economic point of view, there was considerable interest in the subject scientifically, inasmuch as the colour of the two distinct species would enable scientific experimenters to investigate, under advantageous circumstances, the question of parthenogenesis and other obscure points in the natural history of the bee.

Mr. Ledger attributed to the fact of his being the brother of the first importer of alpaca into Australia the honour of an invitation to attend that meeting. He had derived both amusement and instruction from the able paper with which Mr. Bukland had favoured them, and he should not have taken part in the discussion except that he wished to correct an impression that might be entertained from the observations of a previous speaker, Mr. Crawford, that the alpaca would not thrive in Australia. He had made a collection of extracts from the newspapers of the colony, from which he was able to say that the anticipations of Mr. Crawford were entirely unfounded. The alpaca had been introduced into Australia for nearly two years. They had greatly multiplied there. They had increased to the second and third generations in the crosses which his brother had established in South Australia. The *Sydney Morning Herald*, of the 18th October last, contained an article on the subject of the alpacas in Australia, which stated as follows:—

"The flock of alpacas and llamas introduced eighteen months ago by Mr. Ledger are still under his charge, depasturing at Arthursleigh, a sheep station a few miles off the Southern-road. Since they have been there they have thriven surprisingly, and have by successful lambings repaired the losses that were sustained a year ago, at Liverpool, principally through want of fodder. On their landing, in December, 1858, the flock numbered 256; when sold to the government in the following April, it had increased to 291. The deaths last winter reduced the flock so that on arriving at Arthursleigh they only numbered 253; they now amount to about 300. Although very late in the season the lambing is not yet finished; some have been dropped within the last few days, and are doing well. Excepting three, all the lambs born at Arthursleigh have been preserved. The animals are found to attain maturity here earlier than in South America, several instances having occurred of ewes under two years breeding lambs. The course of breeding has already arrived at the fourth cross, and the appearance of the animals, as the breeding progresses, encourages Mr. Ledger to expect ultimately to produce a finer animal than the alpaca of Peru. The experiments of the naturalisation of the alpaca in Australia has been so fully and successfully carried

out, that the alpaca may now be looked upon as an Australian animal."

From that statement no doubt could exist as to the perfect acclimatisation of the alpaca in Australia. It had been remarked by one speaker that this paper would have been more valuable if it had been directed to more practical results; but they must appeal to the useful through the ornamental. He agreed, however, that the acclimatisation Society should commend itself to their attention in the first instance by adding something which was of great general utility. If they wanted encouragement from the past they would find instances in the turkey and the potatoe; and he could show them from figures what had been the commercial effect of introducing a new animal into our Australian colonies. It frequently occurred that when animals were transported from the sphere of their original existence they had become better animals than when they were in their wild state. In 1778 the population of the town of Sydney was 1,030, and its stock consisted of one bull, four cows, one stallion, three mares, and three colts. In the year 1800 the first wool was exported from Sydney, amounting to 658 bales. In 1807, Mr. M'Arthur exported 245lbs of sheep's wool, the first produce of his flock of merinos. In 1858, the quantity of wool imported into this country from Australia was 51,104,560lbs. Might not the alpaca be equally productive? From every account that had been received it seemed probable it would be so. His brother, Mr. Charles Ledger, estimated the home consumption of llama wool, in Peru and Bolivia, at 16,000,000lbs.; and the alpaca being found to be the more valuable commodity for the foreign market, it was more largely exported, whilst a greater quantity of llama wool, which was of much less value, was retained for home consumption. In 1834, the export of alpaca wool from South Australia amounted to 5,700lbs.; in 1838, to 459,000lbs.; and in 1842, to 1,458,000 lbs. Then came an epoch in the history of the alpaca. Mr. Titus Salt, in 1845-6 discovered the means of utilising the wool of the alpaca by an admixture of it with cotton in the warp; and in 1848 the quantity of this wool utilised by Mr. Salt was 1,521,370lbs; in 1853, 2,148,276lbs.; in 1856, 2,300,000lbs; and in 1857, 3,000,000lbs. The average production of wool of a sheep in Sydney and Moreton Bay was 2¼lbs. per fleece. In Victoria and Tasmania the average weight per fleece was 4 lbs., whilst the average of alpaca fleece was 7 lbs., and he might state that one sheep, shorn at the age of fifteen months, yielded a fleece of 12 lbs. weight, and another of 17 lbs. weight. He thought it was unnecessary to say more upon this subject, and he trusted he had said enough to satisfy Mr. Crawford that he was wrong in his anticipations that the alpaca would not thrive in Australia. The letters which he received from his brother from time to time abounded in expressions of the success which had attended the introduction of his flock of alpacas. He had been sent by the Government upon an exploration for a locality suitable for the flock, and having lighted upon Arthursleigh, he at once fixed upon that as the locality suitable for their habitat; and such a report was sent to the Government that they decided that it was unnecessary to go further, but that there the experiment, which had since turned out so successful, should be tried. It had been said that the man who caused two blades of grass to grow where one grew before was a benefactor to his species. Might not the same be said of the man who caused two food or clothing producing animals to thrive and prosper where one only came to maturity before? and if so, was not equal or even more gratitude due to him who caused animals useful to man to thrive where *none* had thriven before?

The CHAIRMAN said in the position in which he had the honour to be placed that evening, a few remarks from him might be expected. He would first mention that the Zoological Society of London had originally been founded in this country by Sir Humphrey Davy and other men of science, for promoting, amongst other objects, the very useful purpose of the acclimatisation of animals. That society had its gardens in the neighbourhood of London, whilst the farm for carrying out the experiments of acclimatisation was at Kingston. In that instance, however, the society did not appear to have been successful, and they ultimately gave up the farm, without having succeeded in introducing a single new live animal. They had at one time a good flock of kangaroos, but they did not succeed in domesticating them. What his friend Mr. Buckland said was true, that this was a subject which deserved every attention. It might be asked why they had not done more? He supposed in this country he might say they were for the most part too busy—too much occupied; but that was not the case with all, and happily those who had the leisure had also the best material means of promoting this object. They were the possessors of parks and rivers, and lands and mountains, and it was to them that he looked more particularly for success, far more indeed than to the labours of their excellent French neighbours in this direction. It was to individual noblemen and gentlemen, in a country like England, that they must look for success in carrying out these measures, and hence an Acclimatisation Society in this country would be most successful, as being a centre for giving and obtaining information, and promoting the views of private individuals, and forming also a central body for turning to account the materials and information obtained. It was under these circumstances they had succeeded, as far as they had yet gone, in the introduction of the eland, which formed an almost exact transition between the deer and the bovine tribe; and he thought with that animal they were likely to have the same success as they had had with the fallow deer. The eland might be naturalized by the same means, and it required no more artificial protection than the fallow deer, which itself was not originally a native of our island. They could not trace the fallow deer in this country further than about 700 years back; certainly he could say that the fallow deer, the red deer, the roebuck, and the reindeer were not the aboriginal deer of this country. The three latter were known as far back as the time when the elephant, the rhinoceros, and the smaller species of the bovine animals were in existence, and also the huge *cervus megaceros*, or fossil elk, which had passed away, and which far surpassed in size anything with which they were acquainted in the present age. Reference had been made to the hunting excursion of Prince Alfred in South Africa, and some regret was expressed that his Royal Highness did not endeavour to import some of those wild animals alive into this country which he had killed in hunting. Now, a midshipman could have but very little room in a ship to be devoted to such purposes; but he could tell them that his Royal Highness had promoted the progress of science by collecting some of the most perfect fossil remains of South Africa which had ever reached England, and these he had sent to him (the chairman), accompanied by a note, characteristic alike of his Royal Highness's intelligence and urbanity. With reference to the alpaca, although for the most part it was a native of the mountainous parts of South America, yet it was not entirely confined to those districts. There were varieties, not specifically distinct from the mountain llama, which found their food on the plains of New Patagonia, and in such situations the conformation of the hoof became more adapted to the less rugged locality which they inhabited; and in process of time that might be the case with the hoof of the alpaca of Australia. Time would not admit of his saying all he wished with respect to the beaver, or the excellence of the meat of the elk. His friend, Mr. Justice Haliburton, had sent him a portion of the latter animal which he had invited Mr. Buckland to partake of, and which was excellent. With regard to another topic—the attempt to introduce new species of birds into this country, it was true, as Dr. Crisp had said, that the introduction of the French part-

ridge might have produced some unpleasant results, in the same way as a certain water-weed which had of late years been introduced into our streams; but if in one instance there had been a failure, he apprehended it would be but a small exception to the general results, and that it ought not to weigh against using their utmost energy in attempting to introduce what might be of great benefit. He had been asked to account for the physiological phenomenon of the almost invariable whiteness of the flesh of tropical animals. He confessed he was not able to trace any connection between this and the heat of the climate. Quadrupeds of the same order as to the structure of the brain which were met with in colder latitudes, had the same pallid white appearance in the flesh, and, therefore, this was not due to the heat of the climate. Moreover, the flesh of the llama and alpaca found in the warm parts of South America was of a dark colour. He would state, with reference to the introduction of the pond fish of this country into the Cape of Good Hope, that that idea originated with the excellent Governor of that colony, Sir George Grey. It was seconded by Mr. Edward Layard, curator of the museum at the Cape, who wrote to him (the Chairman) upon the subject; and after communication with Mr. Alfred Lloyd, as to the making of suitable aquaria for their transmission, he obtained the permission of the Duke of Cambridge to take what pond fish, tench, carp, &c., he required from the waters in Richmond-park, in order to their being sent to the Cape. These specimens, having been taken at the age deemed most favourable for their transport, were forwarded to the Cape under the superintendence of Captain Clarke, who was quite successful in carrying them to their destination; and the fish so transported and reproduced were esteemed an excellent addition to the table, so that in time they would be as much prized in the colony as they were by the monks of old, who first introduced them into this country from the Continent. He believed that practically the establishment of a Society for promoting the Acclimatisation of Animals would form a central machinery for stimulating individuals having conveniences for these experiments, and might be the means of furnishing the specimens in the first instance. This matter had been carried on with great diligence by the Imperial Society of Acclimatisation in France; and with regard to another association formed at some distance from Paris, he (the Chairman) had taken shares, in order to evince the interest which English naturalists took in the matter; and from the reports he had received from the directors they expected much success, and were setting an admirable example, which he hoped would be followed in this country. He had now only to propose a cordial vote of thanks to Mr. Buckland for his very excellent paper.

The vote of thanks was then passed.

The Paper was illustrated by a large number of stuffed animals and skins, kindly lent by Mr. Leadbeater, of Brewer-street; Mr. Bartlett, of the Zoological Gardens; Mr. Roberts, of Princes-street; Mr. Gould; Mr. Lewis Fraser; and the proprietors of the *Field* newspaper; as well as by drawings, lent by Mr. Sclater, of the Zoological Gardens; and pearls from the Tay, lent by Mrs. MacGregor, of Perth.* Mr. Baker, of the Pheasantry, Chelsea, exhibited a living specimen of a small sheep; and Mr. Chief Justice Temple contributed some living specimens of kurassows and guans, and black-boned fowls from British Honduras.

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* See a paper by D. J. Macgowan, M.D., "On Pearls and Pearl-fishing in China," communicated by Sir John Bowring, LL.D., H.B.M. Plenipotentiary in China, *Journal of the Society of Arts*, vol. ii., p. 172.—Ed. *S. of A. J.*

The Secretary announced that on Wednesday evening next, the 5th December, a paper by Mr. H. G. Collins, "On Electro-Block Printing, especially as applied to Enlarging or Reducing from any Printing Surface or Original Drawing," would be read.

The following letter has been received by the Secretary:—

Sir,—Amongst the uses of the acclimatization of animals will not be forgotten the purposes of food, vegetarians notwithstanding.

There is such a thing as the acclimatization of animals after death as well as before, *i.e.*, the question of preserving flesh-food from decay, whatever length of time it may have been kept. At present our arrangements are very imperfect. If dead meat be hung in a current of forced dry air, it is doubtful if it would ever putrefy. It might be dried up in this mode, and become jerked beef or mutton, but would still remain good food. Putrefaction will not take place without the three conditions—moisture, warmth, and stillness. Frozen meat remains unputrefied for any length of time, but by freezing it loses its flavour, and how to restore this flavour is one of the points demanding the attention of the chemists.

The City authorities now and then seize upon and condemn putrid flesh and fish as unfitted for human food. What becomes of this we do not know, but there is little doubt that it would be good food if properly treated. Applying charcoal to absorb the putridity, and otherwise chemically treating it, would probably leave it in as good condition as when first killed. It is worth while to ascertain this, and if it can be publicly made known that it can be restored to the condition of food wholesome for man, it would cease to be dealt with in surreptitious methods, made into sausages, with the poison left in, and so on, and cease to be wasted when ordered to be destroyed. There is no apparent reason why even diseased meat should not be converted into good food, by curing the disease after death as well as before. What we in England call carrion is assuredly eaten in other countries, and possibly many modes of cooking may render it wholesome. It certainly seems at first sight a simpler process to convert dead horse into a ragout than a lady's slipper; and the boiled leather breeches of the Irishman in Lover's tale, if boiled till tender, might, after all, be better tripe than that of a sheep. We might be better employed in England in converting bad fish into good food than the Prussians are in persuading other Prussians to eat dead horse, which, by the bye, is as good as venison if young and tender and properly kept, the chief disadvantage being that it is too dear till it comes to the knackers, of whom, the story goes, a Frenchman purchased his commodity, under the idea that it was good beef. We have not yet got to the end of our food chemistry, and it is well, from time to time, to give those sluggish gentlemen, the chemists, a jog. Perhaps the next move of James Young may be to convert his paraffin oil into fresh butter. The coal pit would prove a splendid cow, if we could turn it to this use. I am, &c.,

COSMOS.

Home Correspondence.

EFFECTS OF TEA AND COFFEE.

Sir,—I observe a letter in the Society's *Journal* of the 16th, calling in question certain remarks made by me, on the subject of the action of theine and caffeine on the system. I would not trespass by asking space in your *Journal*, except that my silence may be construed into assenting to the views therein expressed. As many of

your numerous readers may feel interested in the subject, I would refer them to Johnson's "Chemistry of Common Life" and Lewis's equally admirable "Physiology of Common Life." I am, &c.,

JAMES A. MANN.

Proceedings of Institutions.

GOSPORT AND ALVERSTOKE LITERARY AND SCIENTIFIC INSTITUTION.—The tenth annual report of the committee of this Institution states that the transactions of the past year have been of a very favourable and cheering nature, and afford substantial grounds for hope and encouragement for the future. The number of members at present on the books amounts to 193, being an increase of 28 since the presentation of the last report, and the Committee have reason to believe that that number will be increased, as they are enabled to offer additional advantages. The income of the Institution has been £152 12s. 2d., and the expenditure £136 8s. 1d., the balance in hand being £32 14s. 2d., including £16 10s. 1d., brought from the preceding year's account. There has been an increase of income over the previous year of £22 15s. 5d., and of expenditure of £13 8s. 11d., and all the liabilities of the Institution have been discharged. The lectures have again been a source of pecuniary profit to the Institution, the receipts being £44 4s., and the expences attendant thereon £38 4s. 6d., showing a net gain of £5 19s. 6d. The Committee have continued to issue ladies' lecture tickets, and they are happy to report with increased success, 59 having been purchased, being 16 more than were disposed of during the previous session. The following lectures were delivered with considerable success:—Miss Julia Bleaden, Mr. Alfred Nicholson, Mr. Henry Nicholson, "Musical Entertainment, entitled 'Operatic Sketches;'" Mr. W. R. Birt, F.A.S., "Astronomy, 'A Night among the Stars,' (with Illuminated Diagrams);" Rev. E. L. Berthon, M.A., "On the Stereoscope and Camera;" Mr. George Dawson, M.A., "On Popular Proverbs, their wisdom, or want of it;" Rev. E. L. Berthon, M.A., "On the Glaciers of Switzerland;" Mr. Walter Rowton, "An Evening with Thomas Hood," (with Recitations); Rev. John Power, M.A., "On Infusorial Life;" Rev. H. H. Carlisle, B.A., "On the Life of George Stephenson;" Mr. A. Fairbairn and the Misses Bennett, Musical Entertainment, "A Night wi' Burns." The Committee take the opportunity of officially recording the deep obligation the Institution is under to the Revs. E. L. Berthon, J. Power, and H. H. Carlisle, for their important gratuitous services, the latter gentleman having come from Southampton, at a very short notice, to supply the vacancy occasioned by the sudden indisposition of the former esteemed president, Dr. Andrew Clark. A concert was given in January last, for the benefit of the library, and a profit was realised of £6 6s. This sum, with other money, to the amount of £6 19s. 9d., was appropriated in the purchase of 69 volumes; 3 volumes have been presented, and 8 bound, making a total during the year of 80 volumes; and the Committee recommend that part of the balance in hand be immediately devoted towards the extension of this important department of the Institution. The librarian reports that 126 members have taken out books, and that the number of issues have been 1,062, showing an average of 8 volumes to each member. A Mutual Improvement Class and a Chemistry Class have been formed, and the first named class continued its meetings for a period of six months, with the most satisfactory results. The chemistry class was not attended with that success which had been anticipated. The formation and conducting of these classes entailed no expense upon the general fund of the Institution.

To Correspondents.

ERRATUM.—In last week's *Journal*, page 14, col. 2, near the bottom, for "To Mr. J. C. Morton .... the Society's Medal," read "To Mr. J. C. Morton, ... the Society's *Silver* Medal."

MEETINGS FOR THE ENSUING WEEK.

MON. ...Royal Inst., 2. General Monthly Meeting.
Brit. Architects, 8.
Medical, 8½. Lettsomian Lectures, "On Medicine," Dr. Hare.
TUES. ...Civil Engineers, 8. Discussion "On Submarine Telegraph Cables."
Pathological, 8.
Photographic, 8.
WED. ...Society of Arts, 8. Mr. H. G. Collins, "On Electro-Block Printing, especially as applied to Enlarging or Reducing from any Printing Surface or Original Drawing."
Geological, 8. Prof. James Nicol, "On the Structure of the North-west Highlands of Scotland; and the Relations of the Gneiss, Red Sandstone, and Quartzite of Sutherland and Ross."
Pharmaceutical, 8.
Ethnological, 8.
THURS...Roy. Soc. Club, 6.
Linnæan, 8. Prof. Oliver, "On the natural order *Aurantiaceæ*."
Chemical, 8.
Royal, 8½.
Antiquaries, 8½.
FRI. ......Archæological Inst., 4.
SAT. ...Royal Botanic, 3¾.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, November 23rd*, 1860.]

Date 4th October, 1860.

2102. J. A. Knight, 4, Symond's-inn, Chancery-lane—A new or improved mode of inflating air-mattresses and air-cushions. (A com.)

Dated 18th October, 1860.

2540. A. Debain, Place Lafayette, 24 and 26, Paris—A new or improved sounding apparatus applicable to all musical instruments having key-boards.

Dated 24th October, 1860.

2593. W. R. Taylor, Paradise-house, Oxford—Imp. in rifle belts.

Dated 25th October, 1860.

2599. E. Brefit, 61, King William-street—Imp. in the mode of packing bottles.

Dated 27th October, 1860.

2632. J. Ashby, Croydon, Surrey—Imp. in apparatus for cleaning grain before grinding, and in dressing the same after being ground.

Dated 29th October, 1860.

2640. T. Neal, Saint John-street, Smithfield—Imp. in grinding mills.
2644. A. V. Newton, 66, Chancery-lane—An improved washing machine. (A com.)

Dated 30th October, 1860.

2654. W. E. Newton, 66, Chancery-lane—Imp. in the production of alumina and salts of alumina. (A com.)
2656. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in rotatory engines. (A com.)
2658. T. Tribe, Princess-square, Kennington, Surrey—Imp. in ship's berths, bedsteads, and sofas.

Dated 31st October, 1860

2660. W. Bull, Great George-street, Westminster—Imp. in the permanent way of railways and in connection therewith.

Dated 2nd November, 1860.

2681. H. Williamson, Coventry—Imp. in silver watch cases.
2682. W. Clark, 53, Chancery-lane—Imp. in steam generaters. (A com.)
2683. J. J. G. Taylor, 12, Mark-lane—An imp. in the separation of silex and silicious and other matters from steel.
2685. G. Hamilton, 3, Royal Exchange—Imp. in locks.
2687. R. A. Brooman, 166, Fleet-street—Imp. in machinery for felting threads and other filamentous substances. (A com.)
2689. W. E. Newton, 66, Chancery lane—An imp. in preparing compounds of india-rubber, gutta-percha, and allied gums. (A com.)

Dated 3rd November, 1860.

2692. G. Roberts, Openshaw, near Manchester—Imp. in the construction of steam boilers, and in the flues connected therewith.
2693. W. Durham, Loanhead, Mid-Lothian, N.B.—Imp. in preparing materials for the manufacture of paper.

2695. S. Webb, T. Timmins, and R. Brough, Birmingham—New or improved machinery for the manufacture of nails, spikes, and staples.
2697. G. Shillibeer, City-road, and G. Giles, Fenchurch-buildings—Imp. in the construction of omnibuses and other vehicles.
2699. T. Wrigley, Bridge Hall Mills, near Bury, Lancashire—Imp. in apparatus for filtering water and other liquids.
2700. G. Hinton, Oldbury, Worcestershire—Imp. in the manufacture of iron, steel iron, and steel from certain waste products, and in the machinery or apparatus to be employed in such manufacture, which imps. are also applicable to the re-melting of large lumps of iron or steel.
2701. W. Edwards, Birmingham—Imp. in fire screens or guards.
2702. P. Spence, Newton Heath, near Manchester—Imp. in separating copper from its ores.
2703. J. Mitchell, Keighley, Yorkshire—Imp. in the manufacture of cast-iron pipes, tubes, rollers, and similar work.

Dated 5th November, 1860.

2704. Sir P. Fairbairn, Knt., and R. Newton, Leeds—Improved machinery for heckling flax and hemp.
2705. W. Langshaw, Egerton, near Bolton, Lancashire—Imp. in the means or method of polishing or finishing yarns or threads.
2706. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in travelling bags. (A com.)
2707. E. F. Prentiss, Philadelphia—Imp. in the combination of chemical materials forming a mordant for dying wool and woollen goods.
2709. J. Lancaster, Garden Farm, Dunmurry, Belfast—An improved mowing and reaping machine.
2710. J. Ridley, Stagshaw, Northumberland—Imp. in reaping and mowing machines.
2711. J. Webster, Birmingham—Imp. in obtaining gas (mainly oxygen) for improving artificial light, and for other purposes, also for utilizing the products resulting from its manufacture.
2712. B. Seed, Great Horton-lane, Bradford—Imp. in apparatus used in the treatment of soap suds or other saponaceous or oily matters, which apparatus is also applicable in the treatment of other matters.

Dated 6th November, 1860.

2716. J. Froggatt, jun., Lenton, Nottinghamshire—An imp. in apparatus for burning gas.
2720. W. Pearce, Poole, and E. Bowles, Little Canford—Imp. in apparatus for ploughing land.
2722. H. Thornton, Wardington, Oxon—Imp. in sheds for sheep.
2726. E. Howe, jun., Oxford-street—Imp. in projectiles. (A com.)
2728. J. Higgins, Salford, Lancashire, and T. S. Whitworth—Imp. in machinery or apparatus for preparing cotton and other fibrous materials for spinning.

Dated 7th November, 1860.

2733. W. Cooke, Charing-cross—Imp. in ventilating.
2735. J. Clark, 447, Strand—Imp. in outside shop-lights.
2736. W. K. Hydes, Liverpool—Imp. in steam engines and boilers, and in the mode or method of forming or shaping sheets or plates of metal for certain parts of the same.
2737. J. and E. Radcliffe, Birmingham—Certain imp. in lamps for lighting vestibules, halls, or other like places.
2738. R. Dressel and F. Levestamm, New Oxford street—Imp. in stoves.
2739. J. Church, Boxworth, Cambridgeshire—A brick and tile machine.
2740. R. A. Brooman, 166, Fleet-street—Imp. in liquid and fluid meters. (A com.)
2741. S. Fox, of Deepcar, near Sheffield—Imp. in furnaces used in melting steel and other metals where crucibles or pots are employed.
2742. A. J. Sedley, 210, Regent-street—Imp. in chairs, sofas, and other articles of furniture, used to sit or recline upon.
2743. W. E. Newton, 66, Chancery-lane—Improved apparatus for obtaining motive power from air. (A com.)
2744. I. Maiden and E. Hall, Ashton-under-Lyne—Imp. in slide valves for steam engines.
2745. A. V. Newton, 66, Chancery-lane—An improved mode of, and apparatus for, sewing. (A com.)

Dated 8th November, 1860.

2747. F. C. Husson, Paris—Imp. in power looms.
2749. H. J. Distin, 9, Great Newport-street, Leicester-square, and A. H. Siebe, 12, Baker-street, Portman-square—Imp. in instruments for determining the movements of musical compositions, and which are also applicable for other purposes.
2751. J. Rollinson, Pensnett, and W. Rollinson, Brierley-hill, Staffordshire—An imp. or imps. in working the brakes of winding engines.
2752. T. P. Bennett, Gilnow Mills, Bolton-le-Moors, Lancashire—Certain imp. in or applicable to mules for spinning.
2753. F. Preston and T. Kennedy, Kilmarnock, Ayr, N.B.—Imp. in projectiles for fire-arms and ordnance.
2754. G. Simpson, Glasgow, Lanark, N.B.—Imp. in pumps.
2755. J. Gillies, Glasgow, Lanark, N.B.—Imp. in valves for steam engines.
2756. J. Aitken, Dalry, Ayr, N.B.—Imp. in clocks.
2757. A. V. Newton, 66, Chancery-lane—Imp. in the construction of sewing machines. (A com.)
2758. E. Westhead, Manchester—Imp. in boiling or evaporating soap, saline solutions, or other liquid substances.

Dated 9th November, 1860.

2761. J. Chesterman, Sheffield—Imp. in tents, marquees, and other like articles, parts of which are applicable to umbrellas and parasols, also in machinery for manufacturing parts thereof.

Dated 10th November, 1860.

2763. W. Spence, 50, Chancery-lane—Imp. in breach-loading fire-arms. (A com.)
2765. F. Trouvé, 4, Rue de Bouloi, Paris—A system of publicity called "Memento agenda," otherwise an illustrated general cabinet and pocket agenda.
2767. J. Glen, Glasgow—Imp. in machinery, apparatus, or means for engraving or producing printed surfaces.

Dated 12th November, 1860.

2769. J. T. Pedder, 85, Murray-street, New North-road, Hoxton—A machine for the preservation of life in case of fire in dwelling-houses and other buildings.

Dated 13th November, 1860.

2773. J. Wood, Manchester—Imp. in threading needles for embroidering machines, and also an improved method of working the same.
2775. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—An improved manufacture of coverings for the head. (A com.)
2777. M. L. Henrionnet and L. O. Boblique, 39, Rue de l'Echiquer, Paris—Imp. in the treatment of fossil and other mineral phosphates of lime.
2779. J. Williams, St. Anne's-street, Salisbury—An improved method of obtaining and applying motive power.
2781. W. Roberts, Millwall, Poplar—Imp. in pumps.
2785. A. Deroide and V. Dupouy, Paris—An improved method and apparatus for bleaching all descriptions of vegetable textile fabrics and yarns.

Dated 14th November, 1860.

2787. W. Brookes, 73, Chancery-lane—Imp. in means and apparatus employed in weaving.
2789. R. Furnival, Manchester—Imp. in machinery or apparatus for cutting paper, textile fabrics, and other articles or materials.
2791. W. Robertson and J. M. Hetherington, Manchester—Certain imp. in mules for spinning.
2793. Captain T. A. Blakely, R.A., Holywood, Down—An improved method of increasing the strength of steel and wrought iron.
2795. S. Ling, Heywood, Lancashire—Imp. in apparatus for lubricating steam engines.
2797. J. F. Reeves, 11, Walpole-street, Chelsea—Imp. in the manufacture of paper.

Invention with Complete Specification Filed.

2835. H. Ford, Birmingham—Imp. in coating or enamelling paper, pasteboard, cardboard, cloth, silk, and other similar fabrics. 19th November, 1860.

Patents Sealed.

[*From Gazette, November 23rd*, 1860.]

November 23rd.	1341. C. Aldin.
1286. T. Johnson.	1344. J. Kinniburgh.
1298. T. Dickins and G. McCulloch.	1395. J. Brown.
	1404. W. Clark.
1308. S. Chatwood.	1424. R. Romaine.
1309. G. Robinson.	1500. F. Preston.
1317. C. Schiele.	1648. H. Disston.
1322. W. Jones.	1676. P. Pizzi.
1326. J. Trayes.	1729. G. Spencer.
1327. H. Hughes.	1974. A. Lely.
1328. A. J. Paterson.	2070. C. Mather.
1329. R. H. Collyer.	2260. W. E. Newton.
1339. S. Rowbotham.	

[*From Gazette, November 27th.*]

November 26th.	1369. J. Pinches.
1306. G. Dowler & G. J. Farmer.	1405. E. Michel-Sainton.
1350. T. Cresswell and H. Lister.	1425. J. Combe.
1356. W. Stratford.	1437. T. Willis and G. Chell.
1357. C. W. Lancaster, J. Brown, and J. Hughes.	1443. G. Chatlin.
	2317. J. L. Budden.
1363. I. James.	

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, November 23rd*, 1860.]

November 19th.	*November 21st.*
2908. D. Melvin.	2930. W. McFarlane.
November 20th.	2945. A. Martin and J. Martin.
2995. J. Francis and C. Manby.	

[*From Gazette, November 27th*, 1860.]

November 22nd.	2958. S. B. Wright and H. T. Green.
2929. S. Riley.	*November 24th.*
2939. W. Searby.	2950. W. Blinkhorn.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, November 27th*, 1860.]

November 23rd.	2747. J. H. Johnson.
2737. S. C. Lister.	*November 24th.*
2745. W. L. Brook.	2757. J. Stenson.

Journal of the Society of Arts.

FRIDAY, DECEMBER 7, 1860.

INTERNATIONAL EXHIBITION OF 1862.

By the last mail from the Cape of Good Hope, the news has arrived that Cape Colony and Natal are preparing for the representation of the South African Colonies in the forthcoming International Exhibition of 1862.

Similar activity is being shown in other Colonies. The Committee of Correspondence of the Royal Agricultural and Commercial Society of British Guiana have issued an address, appealing to those by whose exertions the Colony was so worthily represented at the Paris Exhibition in 1855, and to all others who take an interest in its prosperity, to endeavour in 1862 to bring its value and importance to the notice of European capitalists. The Committee contemplate holding a Local Exhibition at Georgetown, about the month of August, 1861, preparatory to the Great Exhibition.

It being thought advisable to form a collection of all printed documents aud newspaper articles which have reference to the Exhibition of 1862, members and others will oblige by preserving such notices as they may meet with, and forwarding them to the Secretary of the Society of Arts, John-street, Adelphi, W.C.

GUARANTEE FUND FOR THE EXHIBITION OF 1862.

The following additions have been made to the List of Guarantors and of the sums guaranteed since the announcement in the *Journal* for November 23 :—

*** *The name marked with an asterisk is that of a Member of the Society of Arts.*

NAMES.	AMOUNT.	REPRESENTING THE OBJECTS OF THE SOCIETY—ARTS, MANUFACTURES, AND COMMERCE.
Amount last announced	£366,800	
*Joseph Bateman, LL.D., F.R.A.S., J.P., 24, Bedford-place, Kensington, W. ...	100	Arts.
George England, Hatcham Iron Works, one of the Directors of the Crystal Palace Company	1,000	Manufactures.
Total	£367,900	

By Order, P. LE NEVE FOSTER, *Secretary.*

EXAMINATIONS, 1861. — NOTICE TO INSTITUTIONS AND LOCAL EDUCATIONAL BOARDS.

The attention of Secretaries of Institutions and Local Boards is specially called to Par. 5 of the Programme of Examinations for 1861, as follows :—

5. A detailed list of the chairman, secretary, and other members of each Local Board, giving not only their names but their addresses and designations, should be submitted to the Council of the Society of Arts before the 1st of January, 1861. In some cases the Local Educational Boards comprise such large districts that for the convenience of the Candidates, Branch Local Boards have to be formed within the Districts. Wherever this is the case, the names and addresses of the members, both of the District Board and of its Branch Boards, must be forwarded to the Secretary of the Society of Arts. All changes in the composition of the various Boards now in existence, or to be formed hereafter, should be immediately notified to the Society of Arts.

PRIZE FOR AN ESSAY ON MARINE ALGÆ.

A Prize of £100 has been placed at the disposal of the Council, by Sir W. C. Trevelyan, Bart., to be awarded for "The best Essay on the Applications of the Marine Algæ and their products, as food or medicine for man and domestic animals, or for dyeing and other manufacturing purposes. Competitors must give the results of their original investigations on seaweeds ; and they must prepare a series of specimens illustrative of the best modes of collecting, preserving, and preparing the several species. Mere compilations will not be admitted to competition."

The Essays, with accompanying specimens, must be sent to the Society of Arts by the 31st day of December, 1860. Each Essay to be marked " Essay on Marine Algæ," and to have a motto or distinctive mark attached, which mark must also be written on a sealed letter, containing the name and address of the author.

The letters containing the names and addresses of the authors will remain with the Society of Arts, and none will be opened except that bearing the motto or mark attached to the Essay to which the adjudicators award the Prize.

Copies of the conditions may be obtained on application to the Secretary of the Society of Arts.

THIRD ORDINARY MEETING.

Wednesday, December 5, 1860.

The third Ordinary Meeting of the One Hundred-and-Seventh Session was held on Wednesday, the 5th inst., George Cruikshank, Esq., in the chair.

The following gentlemen were proposed for election as Members of the Society:—

Andrews, W. P. .... 26, Montague-square, W.
Harrison, Archibald Stewart. 133, Upper Thames-street, E.C.
Heath, T. Vernon .... 43, Piccadilly, W.
Moate, C. R. .... 65, Old Broad-street, E.C.

The following candidates were balloted for and duly elected members of the Society:—

Adams, John ....Hamilton, N.B.
Aldam, William, ...Frickley-hall, near Doncaster.
Alexander, Henry B. ......The Laurels, Barnes, S.W.
Artingstall, George.........Warrington.
Baldry, James Danford ... 2, Queen's-square-pl., Westminster, S.W.
Barnet, George ....2, Leinster-gdns, Hyde-pk., W.
Bartholomew, C.............Broxholme, Doncaster.
Begbie, Thos. Stirling......4, Mansion-house-place, E.C.
Boulton, Joseph ....28, Bagnigge-wells-road, W.C.
Bradbury, James ....Huddersfield.
Bragg, John.................. 18, Vittoria-st., Regent-place, Birmingham, and 18, Thavies-inn, E.C.
Bramston, William.........11, Waterloo-place, S.W.
Bridgewater, John ....41, Wood-street, E.C.
Campbell, Colin Minton... 9, Albion-place, Blackfriars, S., and Hartshill, Stoke-upon-Trent.
Campbell, Hugh............4, St. Paul's-grove, Canonbury, N.
Caplin, Madame Anne Roxcey .... 58, Berners-street, W.
Chadwick, John ....12A, Mosley-street, Manchester.
Charlton, Henry .... 10, Great Charles-street, Birmingham.
Chawner, Richard Croft ...The Abnalls, Lichfield.
Churchward, J. G. ....Admiralty-house, Dover.
Clark, Cyrus ....Street, near Glastonbury.
Clarke, I. P. ....King-street, Mills, Leicester.
Clayton, Nathaniel.........Stamp End Works, Lincoln.
Clements, Robt. George...93, Church-st., Shoreditch, N.E.
Cosens, Fredk. Wm. ......16, Water-lane, Tower-st., E.C.
Coulthurst, Wm. M. ......59, Strand, W.C.
Cowie, Thos. S. ....24, George-st., Hanover-sq., W.
Cremer, Wm. H., jun....... 210, Regent-street, W., & 10, Bridge-st., Westm., S.W.
Deacon, Solomon............ 59, Alma-street, New North-road, Hoxton, N.
Docker, F. W................24, Denbigh-st., Pimlico, S.W.
Elkington, Alfred .... 22, Regent-street, Waterloo-place, S.W.
Emanuel, Harry ....21, Hanover-square, W.
Ernest, Henry................4, Whitehall, S.W.
Fetherstone, John Wm....Church-street, Longford.
Gaskell, John ....St. Nicholas-at-Wade, Margate.
Grant, Alexander ....2, Clement's-ct., Wood-st., E.C.
Gruneisen, Chas. Lewis ...16, Surrey-street, Strand, W.C.
Hannington, C. S. ....North-street, Brighton
Harrison, Thos. E., C.E. 27, Great George-street, S.W.
Hartley, James ....Wear Glass Works, Sunderland
Heather, James .... The Crescent, Camden-road-villas, N.W.
Heymann, Lewis.... ....Stoney-street, Nottingham.
Holland, P. H. ....36, Camden-square, N.W.
Horn, James ....14, High-st., Whitechapel, E.
Isaacs, Saul ....6, Thurloe-sq., Brompton, S.W.
Johnston, Rev. Jno. Brown .Glasgow.
Joyce, Rev. Jas. Gerald...Strathfieldsaye, Hants.
Kelly, Sir Fitzroy, M.P....32, Dover-street, W.
Kimpton, Thomas ....6, Bath-st., Newgate-st., E.C.
King, John B. .... 4, Gloucester-road, Kensington-gate, W.
Kinns, Samuel, Ph.D. ...Highbury New-park, N.
Landon, James .... 88, Inverness-terrace, Bayswater, W.
Lawson, Charles, Senr......Edinburgh.
Lea, Charles ....Broad-street, Worcester.
Levinsohn, Lewis ....7, Finsbury-square, E.C.
Lightly, William ....123, Fenchurch-street, E.C.
Lockwood, Ben...............Huddersfield.
Maclea, Charles G..........17, Blenheim-terrace, Leeds.
Maw, George ....Benthall-hall, near Broseley.
Middleton, Capt. Sir G. N. Broke, Bart., C.B. Shrubland-park, Ipswich.
Miles, W. P. ....Forest-hill, Kent, S.E.
Munn, Major W. A. ...... Throwley-house, near Faversham.
Napier, Hon. William ... 2, Old Palace-yard, Westminster, S.W.
O'Hagan, John ....81, Lombard-street, E.C.
Oldham, James, C. E......Austrian-chambers, Hull.
Payne, James .... Canada-mills, Rotherhithe, S.E.
Peake, Thomas .... Brampton-lodge, near Stoke-upon-Trent; and the Tileries, Tunstall, Staffordshire.
Potter, Edmund, F.R.S....Dinting-lodge, Glossop.
Read, Reginald, M.D....... 1, Guildford-place, Russell-square, W.C.
Reid, Hugo .... Linden-cottage, Blackheath-hill, S.E.
Richardson, Thomas ...... 20, New Bridge-street, Newcastle-on-Tyne.
Rigby, George ....7, Park-lane, Piccadilly, W.
Robinson, James ....7, Park-lane, Piccadilly, W.
Rule, Rev. W. H., D.D....Aldershot.
Rutley, John Lewis ...... 5, Great Newport-street, Long Acre, W.C.
Rylands, John ....New High-street, Manchester.
Sage, Frederick ....11, Hatton-garden, E.C.
Shaw, Charles Henry......55, Charing-cross, S.W.
Sherriff, A. C. ....Shrubs-hill, Worcester.
Shuttleworth, Joseph......Stamp End Works, Lincoln.
Simon, George...............123, Fenchurch-street, E.C.
Smith, George Henry ... 16, Queen's-chambers, Manchester.
Stanton, George ....Coton-hill, Shrewsbury.
Steevens, William .... Agnes-villa, Godolphin-road, New-rd, Hammersmith, W.
Storm, W. Montgomery C.E. .... New York, U.S.
Sulivan, Rt. Hon. Lawrence .... Broom-house, Fulham, S.W.
Telford, Charles ....Widmore, Bromley, Kent, S.E.
Thomas, Edwin, C.E....... 20, Wharf-street, City-road Basin, E.C.
Thompson, Harry S., M.P... Kirby-hall, York, and 7, Mansfield-street, W.
Vickers, George ....Sheffield.
Vieweg, A. J. ....82, Wood-street, E.C.
Virtue, James S. ....294, City-road, E.C.
Welch, John K. ....51, Berners-st., Oxford-st., W.
White, Bromley .... 4, Princes-street, Bank, E.C., and 15, Percy-place, Clapham-road, S.
Wilkinson, David .... 2, Park-street, Higher Ardwick, Manchester.
Willet, John, C. E., ...35, Albyn-place, Aberdeen.
Wood, John..................Thadden-grange, Alton, Hants.
Woollams, Henry .... 110, High-street, near Manchester-square, W.

Wrigley, Francis............ 16, Queen's-chambers, Manchester.
Zanzi, Alexander............30, Brompton-crescent, S.W.

The Paper read was—

ON ELECTRO-BLOCK PRINTING, ESPECIALLY AS APPLIED TO ENLARGING OR REDUCING ANY PRINTING SURFACE OR ORIGINAL DRAWING.

By H. G. Collins.

In bringing before your notice, this evening, my inventions, commonly known as Collins' patents, and now being worked by the Electro-Printing Block Company—which, by the way, is a "misnomer," for which I beg to apologize by stating, that in the formation of the company, these processes were found to embrace so many results, that actually the name to identify ourselves became a difficulty, and in an unhappy moment, and amongst a multitude of councillors, a most inappropriate name was selected, as you will readily perceive during the reading of this paper—it will be useless to occupy your time in discussing the advantages derivable from any means of producing or reproducing cheap illustrations, their necessity is universally acknowledged, and is becoming daily more and more apparent. Few books are now published entirely without them, and when we consider the charm that a narrative assumes when enlivened by a few touches of the artist, and how much more intelligible the description is rendered, we cannot wonder that the art of engraving, or rather of producing illustrations, should occupy such an important position among the arts of the present day. Illustrations possess, in many respects, a greater power of conveying knowledge to the mind than the most elaborate description in words. How could the beauties of nature and of art be described without their aid? Take them away, and what absurd notions should we possess of the appearance of every place we had not personally visited, and every tangible object which we had not seen, in fact, what would be our ideas of the world around us, and immediately out of our own sphere, if we had not the delineating powers of the artist to make its outward form and beauties apparent to our senses. It is somewhat difficult for us, who have all our lives been accustomed to their assistance in an educational point of view, to realize to ourselves what our ideas of things in general would be had we never looked upon an illustration. Take, for instance, a sunset in an eastern clime, perhaps one of the most magnificent sights with which Nature, even in the plenitude of her generosity, could enchant the eye of man; and I ask, would a closely-printed octavo volume give so correct an idea of what such a sight actually is, as a rough sketch drawn in a few minutes. The necessity for illustrations being conceded, it is the universal aim to render their production as cheap, as quick, and as perfect as possible; and any invention which claims to facilitate these objects, I am sure requires no apology for its introduction to the public.

My first patent, dated the 5th March, 1858, is, to use the words of the specification, for "An improved mode of obtaining impressions on an enlarged or diminished scale from engraved plates or other printing surfaces." I will first describe the method of enlarging.

I take my subject, which may be a printing surface of any description, either a wood cut, a steel or copper-plate engraving, a stereotype or electrotype block, or a lithographic stone, and in fact any surface capable of giving off an impression; and then on a sheet of vulcanised india-rubber, covered with a composition possessing equal elasticity, and of a non porous character, I take the impression in transfer ink; if from stone, at the lithographic press; if from steel or copper-plate, at the copper-plate press, and if from surface-block or type, at the type press. I then punch small holes at equal distances (generally half an inch) round the rubber, into all of which I insert hooks of the same size. I connect them, by means of four bars passed through the body of these hooks, and thus the sheet is ready for the expanding machine. This consists of two parts, the table and the screw. The table is composed of slate, perfectly even, and mathematically true; round it is a sort of raised shelf for the four bars before mentioned to rest upon, and divided into inches, half-inches, quarter inches, and eighths. I place the sheet of rubber, with the hooks and bars round it, square upon the frame, then take the screw, and after duly fixing it, I extend the rubber equally in all directions till it assumes the required size. I test the accuracy of the extension, from time to time during the operation, by measuring the distances between different marks printed on the sheet for that purpose when in an unextended state, and I adjust the tension until I find that the distances have all been increased in the same ratio. The impression on the rubber being thus enlarged, I transfer it to a prepared surface of stone or metal, which is then printed in the usual mode of litho or zincography. When the amount of extension required is greater than can be well obtained at one operation, which is generally limited to four times the area, it is only necessary to repeat the process.

For reducing—the operation is simply reversed. I extend the rubber first to the original size of the work to be reduced, then take the impression; after which I release the sheet from the tension, which then necessarily assumes its original dimensions; it is then put upon stone or metal, as before described, in the same manner as the enlarged subject, and printed in the usual way.

It is as well to mention that the indian-rubber, in order to extend equally, must be made of an uniform substance in every part, for the old axiom must here prove true, that the same thing, under the same circumstances, must always produce the same result; and it will be obvious that the slightest variation in this particular would materially detract from the perfection of the process; for if any portion should be thinner than the general character of the sheet, that portion must of necessity possess greater yielding power than the remainder, and thus produce an inequality, and a consequent error in its mathematical proportions, and although this slight difference might not signify for ordinary work, such as landscapes, or general illustrations, it would totally preclude the adoption of my invention for maps and plans, or any matter where accurate scales would be indispensable. This perfection in the rubber has not been obtained without great cost of anxiety, time, and money, as in my first steps I was not sufficiently acquainted with the wonderful mysteries of its nature, and consequently was unable to furnish the manufacturers with all the conditions required, the knowledge of which has only been obtained from pure experiment and closely calculated results; and I am happy to say that at length all these difficulties have, through the kindness and assistance of the various india-rubber Houses, especially Messrs. Silver, of Silvertown, been entirely surmounted.

With respect to the composition with which I coat the face of the sheet, I may mention, that without it the rubber would not give off the impression to the stone; in fact, the ink would be entirely absorbed; it is simply a transfer surface, involving the one necessary condition of equal tension with the rubber, or it would crack when extended, and destroy the picture. It is composed generally of flour, treacle, starch, white lead, and gelatine, and, when reduced to the consistency of cream, is applied with a brush, and allowed to become quite dry before being used.

Having thus described the nature of this, my first patent, and the manner of performing the same, I would have it understood, again to use the words of my specification, that I do not confine myself to the exact details described, but what I claim is, the taking an impression from an engraved plate or other printing surface on to a sheet of vulcanised india-rubber, and then,

either after stretching such sheet, or allowing it to contract, as the case may be, transferring from such sheet on to a lithographic stone or other suitable printing surface, from which a great number of impressions may be printed. Thus far and no further had I contemplated proceeding at the time of procuring this patent; but, although its value was great and self-evident, it was offered as a kind suggestion to me, by the well-known Mr. Mark Lemon, whether its usefulness would not be materially increased were I able to obtain the enlarged or reduced impressions on surface blocks to print at the type press. Producing them on stone, though a great achievement, was not all that could be wished, for where a great number of copies are required, as is the case in these days of beautifully-illustrated literature and pictorial newspapers, the expense and tediousness of working from lithography would in many cases be an insurmountable difficulty. After a series of experiments, I succeeded in this respect, and hence my patent, dated 2nd October, 1858.

Agreeably to my specification, this invention has for its object improvements in the production of blocks or surfaces to be used in printing. For these purposes, the drawing, device, or matter is obtained on a block or surface to be used in printing from a drawing, device, or matter on a lithographic stone or other surface, whether the same has been produced thereon by hand, transferred, or otherwise, by subjecting the drawing, device, or matter on the lithographic stone or other surface to a series of processes similar to that in which a lithographic stone is inked when about to be printed from in the ordinary way, but the ink or composition used is to be mixed with suitable driers, so that each succeeding coating of the composition may quickly dry or set before the next coating is applied. By these means the lines and parts constituting the drawing, device, or matter on the stone or other surface, which would be inked and printed from if used in the ordinary manner, become more and more built up or raised; and when such raising has been sufficiently accomplished, a cast in wax or other suitable material is taken, from which an electrotype is obtained, as is well understood.

I do not, however, confine myself to this method; much depends on the character and quality of the work. In many cases, after obtaining the transfer on stone or zinc, instead of building up the picture by successive rollings, I eat away the surrounding part by acid, taking care that the transfer is made in ink, that will resist the action of acid and the galvanic battery, or that it be rolled up with a varnish possessing the same qualities. For fine work this second method is much more satisfactory.

I have now placed before you, in as simple a manner as possible, the *modus operandi* of my process for enlarging and diminishing maps, plans, and engravings on to the stone and likewise for making surface blocks therefrom. In so doing, I have not occupied much time; indeed, the manipulation is so easy and devoid of all intricacies, when once practically understood, that it scarcely requires the length of a paper to give the necessary explanations respecting it. I must however tell you that from these two patents have sprung several valuable adjuncts. The first, and perhaps most important, is the production of electrotype blocks from the artist's original drawing, without the aid of the engraver. I simply require the artist to make his sketch on transfer paper in transfer ink, or, if he prefer it, in transfer ink upon a grained metal plate, and this, when delivered into my hands, I roll up with the acid-resisting composition, and then submit to the process before described for making surface blocks from the lithographic stone.

I have also succeeded is making transfers on to stone from most old prints and typography, which may be enlarged or reduced to any size, and made generally into electrotype blocks.

Photography and many other valuable processess in connection with the illustrative art are now engaging my attention, and I have no doubt that in a short time I shall be able to produce an electrotype block from a photograph in the course of a few hours.

We will now, with your permission, turn our attention for a few moments to the commercial value of these inventions, for after all this perhaps is the most important consideration. Many marvels of ingenuity (which title for my inventions I by no means claim) have left their originator unrewarded on account of the very cleverness and ingenuity displayed in their construction. Were I able to produce a printing block from a mere thought, or by the touch of a magic wand, it would be commercially useless if it cost me £1 to do what could be effected by the old method of engraving for 10s. I however will apply the inventions to a few cases, and then leave the decision to your own impartial judgment.

1st. These processes are peculiarly applicable to publishers possessing a large plant in wood cuts and plates, which can be reduced or enlarged to any size required in a very short space of time, and at considerably less cost than the re-engraving of the same; hence, 4-to works may be made into 8-vo., or 12mo., and *vice versa;* from one set of plates of a Bible many sizes may be produced, saving the price of re-setting and the reading (in itself a very considerable item); a map publisher may, from one good set of plates, have every requirement supplied. By reducing them and erasing the names of all places of minor importance, an atlas can be produced for the lower forms; by increasing them, and inserting such places, an atlas will be ready to hand for the library or drawing-room; and, by extending them still further, wall maps of any size can be made.

It may here be as well to notice that the finer and more elaborate the work, the greater will be the advantage in point of price—for being a process totally independent of manual labour on individual lines, and all the parts of a picture being operated upon at the same moment of time, it is obvious that the charge cannot be regulated by the quality or intensity of the work. Thus, a block of four inches square, with simply a triangle thereon, would take as much labour to produce as the same area covered with the choicest work; and whereas to charge 5s. for the first, would not be cheaper than the engraving on wood, to charge 25s. for the second would perhaps not be a quarter the price.

I consider the process of making electrotype surface blocks from the artist's original drawing, will prove an immense advantage to publishers generally, and will do much to increase the number of illustrated books, newspapers, and periodicals. By its adoption a work can be enriched with the choicest productions, at the cost of comparatively a few shillings, and the shortness of time with which a series can be executed must be experienced and proved to be duly appreciated. In fact, illustrations, instead of, as formerly, forming a very serious item in the calculation of cost, will be looked upon in that particular as little more than the setting up of a page of type. I think I can see the time coming when our cheap literature, notwithstanding its rapid advance in point of character during the last few years, will assume a position in the world of letters which was never anticipated by its most enthusiastic admirers and advocates. As it is now with authorship, so it will be in the fine arts—a few years since we should never have anticipated, and could not have believed it possible for the pages of a 2d. or 3d. weekly periodical, or a shilling monthly serial, to be adorned with the writings of such bright luminaries as are not only not ashamed but proud to contribute to their pages; and however incredulous we may now be, I believe the period is not far distant when the artistic compositions which now appear only upon the shelves and walls of the rich will be equally possessed and appreciated by those less blessed with this world's goods.

Again, what increased facilities are hereby offered to proprietors of illustrated newspapers already existing, and to those who contemplate such speculations. I can confidently affirm that any number of cuts for such purposes

which would cost, by the old system of wood engraving, £100, can be equally as well produced by my method for (at a very moderate calculation) one-third that price. I would say to them, employ artists of first class talent, and however elaborate the execution of the subjects may be, the cost of making them into blocks for printing will be no more than that of the most common, coarse, and inartistic designs; and, further, the time consumed in the production is so trifling that a passing event can be presented to the public in an elaborate illustration in the course of a few hours.

I fully contemplate, from a series of experiments upon which I have been engaged the last few weeks, the shortly being able to take a photograph of any passing scene, and to make the same into a block, ready for press, within six or eight hours; thus affording to the public the opportunity of being supplied with what may be termed really a daily illustrated newspaper; and it would not be any presumption to say that, as in times gone by, Sir Robert Peel was handed a newspaper before he left the "House" containing the whole of his speech, which had taken him four hours to deliver, so we shall by this new aid be able to furnish an illustrated newspaper containing a faithful delineation of any grand or imposing ceremony that may have taken place during the day.

Another great advantage, which I cannot allow to pass without particular mention, is, that the electrotype blocks must of necessity be perfect *fac-similes* of the original sketches; that, being purely a chemical process, every line must be faithfully preserved; consequently the slightest touch, even a dot, cannot but be accurately represented; it is not a copy, but actually, truly, and in reality the artist's sketch itself transformed into a printing surface. This I conceive a very important consideration, for we are all well aware that a design, in going through the engraver's hands, is exceedingly liable to lose many of the fine touches and almost hidden beauties which so often appear in the productions of the eminent men of the present day, and which, although vividly perceptible to an appreciating eye, exist more on the paper as a thought than as a line. These, I repeat, are reproduced to a certainty by this process.

The transferring of old prints and typography I believe will prove of great utility, for by this any old and valuable work can be reproduced in *fac-simile*. Take, for instance, an original edition of Shakespeare, the type of which has long since been destroyed, and cannot be obtained at the present day without great cost and inconvenience; by simply supplying a copy of the book itself, its pages can be first transferred to stone, and then made into surface blocks at a very trifling expense. Old engravings, the plates of which are now no longer in existence, can be treated in precisely the same manner, and the gems of by-gone days, long since forgotten and hidden in the dust and obscurity of rolling years, can thus be resuscitated for the gratification of a modern but not less admiring people. It is quite unnecessary, as it would be tedious, to traverse on this occasion the various fields open to this single arm of the process; but I see that its application can be made available to such numberless cases that to my mind the difficulty would appear rather where to commence. This, however, is more for the consideration of others than of myself, and I hope, as I believe, that it only requires a fair, true, and unvarnished statement of facts to set those thinking who have the power, the ability, the money, the time, and the will to turn to their own advantage—and, consequently, to the advantage of the public—any invention which has just claims on their consideration and attention.

For the purpose of illustrating advertisements and show-cards, labels, &c., these processes will doubtless prove of great advantage—the feature of pure identification with the subject of the advertisement being clearly established. Thus take the illustrated title of a book or publication, such as the *Cornhill Magazine* and Chambers's *Encyclopædia* (both of which were executed by my method), and enlarge them to one size for show-cards, and to a larger size for posters—thus the same design is reproduced in various dimensions and forms without the expense of re-engraving. I may mention that advertisers would do well to employ a superior class of talent for the original design, as the cost of perpetuating it will be no more than the reproduction of as unartistic a placard as ever appeared upon a wall; thus, if I mistake not, the character of illustrated advertisments will be entirely changed, and instead of the large unsightly bills, upon which we have hitherto been accustomed to gaze, we shall have the various new publications and articles of every description commended to our attention through the medium of the fine arts. I will not trespass upon your time in discussing at length the various channels open to the introduction of these processes generally, but I may mention that for all manufactures involving Art, Taste, or Design, such as pottery, lace, &c., they must necessarily prove of the utmost utility. A design for a dinner service can be reduced, enlarged, and altered in form for the various-sized dishes and plates, and the patterns for lace and other fabrics can be diversified in precisely the same way, as circumstances may require. The grand application, however, for which I consider these patents most peculiarly and eminently fitted—both on account of the immense saving of the public money they would effect, the comparatively short time in which all the work could be executed, and the perfect accuracy with which it would be accomplished—is the enlargement and reduction of the Ordnance survey, a work now going on, involving a large staff, and consequently an immense outlay, as it appears to me in reading Colonel James's report to the "House;" for he there states that he requires a sum of somewhere about three millions and a half, distributed over thirteen years, to meet the Government requirements, which I should be very happy to undertake to produce in about two years for one-third that sum.

DISCUSSION.

The Chairman said, an experience of nearly fifty years in drawing upon wood, might, perhaps, be supposed to have given him some acquaintance with the subject. He had often experienced the difficulty of getting his drawings faithfully rendered by wood-engravers, although in some instances they had been executed in the most beautiful style of art, by such accomplished artists as Thompson and Williams. He believed they had a vast number of talented wood-engravers, but there were none superior to the names he had mentioned. Still the production of first-rate wood-engravings was an expensive as well as a tedious operation. Feeling, therefore, that cheapness was desirable for the public advantage, he had made many attempts, and had lost some time and money in labouring to reproduce his drawings without the intervention of the wood-engraver, but hitherto he had not been able to accomplish his object. He was so satisfied with the process which had been brought before them that evening, that nothing but the excessive occupation of his time had prevented him from producing some work which might be reproduced in that way, but he hoped it would not be long before he did so. They might be satisfied that what was called surface-printing, which could be combined with letter-press, was of vast importance, as it afforded a large amount of information as well as amusement; and, moreover, formed a very important element in education. In the present day the number of highly educated people had much increased compared with what was the case in former times. If they looked at the earliest wood engravings, they found them to be of a very dark and dismal character; indeed, it was almost a matter of surprise that the minds of men in those days could have been satisfied with such inferior productions. In process of time, however, the art of wood engraving improved, but even then it had its disadvantages, for the wood blocks very rapidly wore out. Hence the process of stereotyping was intro-

duced, and answered very well for a time; but that was now, to some extent, superseded by the electrotype. If, however, Mr. Collins's process were such as he had described it—which he (the Chairman) saw no reason to doubt—they would find that good illustrations in cheap works would become much more general; and when they considered how many millions of human beings there were to be educated, they could hardly calculate the immense advantages which might be derived from this process.

Mr. Le Keux wished to put a question with reference to the specimens of designs for pottery exhibited. At present he gathered that this process was adapted to surface printing, as well as to printing from plates, but as regarded pottery, he had always understood that the engraving for such purposes required to be cut very deep with a graver in order that there might be a sufficient body of ink to give the proper effect when exposed to heat. He begged to ask whether Mr. Collins could, by his process, produce surface blocks suitable for ceramic purposes. There could be no doubt as to his power of multiplying the designs, but he wished to know whether the process was directly applicable to pottery printing.

Mr. Collins replied that it was, but not by means of surface blocks. He had produced a surface block for the purpose, but he had not yet succeeded in producing a colour that would stand the firing. He could not obtain the colour of sufficient consistency to be available for surface printing, for a kind of wiping action took place in using surface blocks, which removed the body of the colour, and it would not then stand the heat of the fire. That was a matter to which his attention was at present directed. For pottery printing they were still limited to the incised lines, which he could produce by his process as well as by engraving.

Mr. Le Keux asked whether Mr. Collins could get the deep line engraving.

Mr. Collins replied in the affirmative.

Mr. Le Keux added that he should have been better pleased if more art and less mercantile feeling had been brought to bear upon this subject. As to reproducing old plates, printed in a stiff ink, which made the surface stand up, he did not think that could be done at present in a way to deceive collectors; but, supposing any step was made in that direction, he believed a finishing would be required, which could only be given by the hand of the artist.

The Chairman said it was not for a moment to be supposed that this process would supersede the manipulation of the artist, nor would it decrease the value of original works of art. These would always stand pre-eminent. A fine work of art was alwas an expensive affair to publish, and it required persons of property to become the purchasers of such works. But as the taste and intelligence of the people increased they would desire to possess those works of art themselves. Their means would not allow them to obtain the first impressions from the plate itself, but when the plate was done with, as far as the more wealthy class of people were concerned, they could bring them within the means of the second and third classes of society by the aid of this process. He thought a good work of art, once produced, should never be destroyed. He disapproved of the course of enhancing the value of an engraving by destroying the plate after a given number of impressions had been worked off. A good work of art was a great work, and a good engraving was, indeed, a wonder. He knew something about etching, though he could not engrave; but he was sufficiently acquainted with it to know that it was a task of immense difficulty; and when they looked at a good engraving, they beheld a wonderful work of art. If they could give the poorer classes a fair copy of such a work, they would be conferring on them a great boon. There were hundreds of thousands of square yards of bare walls in the cottages throughout the country, which ought to be covered with prints of some kind, and this process he believed would be the means of giving the poor man copies of good works which he would never otherwise possess. In fact, they found that there was a rapidly growing taste in these matters. In travelling they found even the porters' rooms at the stations with prints from the cheap publications, and the walls of country cottages were similarly decorated. This showed an improved taste, and they could hardly estimate the good that such a process as this might effect.

Mr. Masterman would be glad to be informed whether Mr. Collins's method was cheaper and more effectual than that of which he had read in the *American Photographic Journal*, and which he believed had been introduced into the Ordnance survey department at Southampton. It was a process called Photo-zincography. By producing a reduced or enlarged negative on glass, they could, by the aid of the sunlight, transfer it to zinc, from which they could produce reduced or enlarged copies of the Ordnance maps. He should like to know whether Mr. Collins's process was cheaper and more effectual than this method.

Mr. Collins was aware of the process alluded to, but he believed it would be found that the copies were not perfectly correct, inasmuch as there was an optical distortion in the camera, which prevented a right line being obtained. Besides this, he could by his process produce copies more rapidly than could be done with the camera. The operators with the camera were limited to sunshine or bright days, whereas the state of the atmosphere or the time of day had no effect upon his process, which could be employed at any time.

Mr. Masterman was glad to find that an improvement had been made upon what he considered was already a great advantage.

Mr. George Smith remarked that upon inspecting the electrotype plate of the map which had been handed round, it struck him that some of the lines were very deep and others comparatively shallow. Mr. Collins had stated that he produced the depth of line by repeated rollings, whereas, in his (Mr. Smith's) ignorance of the subject, it appeared to him that the rolling would be calculated to increase the depth of the lines all over the plate. In ordinary block-printing there were many parts in which the lines required to be much deeper than in others. He therefore could not understand how this was effected by the rolling.

Mr. Collins replied that if they kept to the rolling they could produce any depth of line they might require; but he had stated that where they had to deal with fine work he did not restrict himself to that mode; but he printed the picture with an acid-resisting ink, and then subjected the plate to the galvanic battery; and when they had the necessary depth of line for the ordinary printing, for the very broad lights they blocked up with wax before electrotyping. The latter operation was an easy one, which could be performed by a boy or a girl at a very small expense.

Mr. M. Hanhart thought this process would be found highly useful, and without intending to throw any doubt upon the merit of the invention, he wished to inquire whether Mr. Collins was aware of the fact that many years ago there was laid before the Graphic Society a series of reduced or enlarged impressions similar to those now exhibited. There was a great deal of secrecy about the matter at the time, and he had heard nothing more on the subject. Then, with regard to the machinery used in this process, he recollected that in Class No. XXVI. of the Paris Exhibition in 1855, Messrs. Deviliers and Célérin exhibited a machine for enlarging and reducing designs for calico printing, called an Ecteno-cynolographe. It did not, however, actually produce either plates or printing blocks. The machine was in appearance similar to a musical drum, with screws, by means of which a greater or less extension could be given to the india rubber stretched across it. The drawing was made with common lithographic ink or chalk.

Mr. Collins was not aware of the circumstance of such

impressions of plates as the last speaker described having been laid before the Graphic Society. Certainly they had not emanated from himself, and he did not think any patent had been taken out for the process, because all the authorities were carefully looked into before his patent was obtained. With reference to the last-mentioned machine, he was aware of its existence at the time, but that was for printing direct from the rubber, whereas his process was for producing enlarged or reduced designs on stone or printing blocks. In the former case only a solitary pattern was obtained, or, perhaps, by great energy two or three impressions might be taken off, but by his plan he could produce any number of copies required.

Mr. Jones inquired whether the extension of the india-rubber was uniform over the whole of the surface. If they stretched a piece of that material they found the extension greater about half-way between the forces, and that in the centre it grew thinner. He therefore concluded that the extension of the drawing would take place more in the centre of the india-rubber than at the sides. He would ask whether Mr. Collins had found the extension to take place uniformly throughout the whole substance, and if this were not the case, could he not use a piece of india-rubber so graduated in thickness as to produce perfect uniformity?

Mr. Collins would answer that question by stating facts. In order to test the uniformity, the india rubber was printed in quarter-inch squares, from a plate accurately machine-ruled, and if they ran the compasses over it after the stretching, they would find it mathematically correct. He was willing to submit to a test of 800 lines to the inch at any part of the rubber, either at the centre or at the edges.

The Chairman said that with respect to the originality of Mr. Collins's process he would say this was not the first time experiments had been made in that direction. It was quite true that various attempts had been made, but with doubtful success. The powers of steam were known for many years before the mind of Watt rendered them available for the practical purposes of life. He believed all the efforts made prior to Mr. Collins's invention were more or less failures; and, therefore, to the man who had successfully solved the problem the real credit was due.

Dr. Kinns inquired whether the faintness noticeable in the copy exhibited of the print of "the Naughty Boy" was the result of accident in the printing, from not sufficient ink being used.

Mr. Collins replied it was merely in the printing, as anyone acquainted with that operation would at once see. After twenty or thirty impressions had been worked off the block would be in good order, and the impressions would be given with sufficient depth, and with the proper bearings of light and shade.

Mr. Hood said, in the consideration of this subject, one difficulty had suggested itself to him; that was, that in a fine engraving, reduced to a very small scale, the fine lines would be apt to clog up and form a black ground. Had Mr. Collins any means of preventing that?

Mr. Collins said there was, of course, a limit, both to enlargement and reduction. Reduction might certainly be carried too far, and it was the same with enlargement. They might enlarge a subject till it became so coarse as to be offensive to the eye.

Mr. Varley regarded this process as a great advance upon an invention introduced to the Society many years ago. Long before vulcanised india-rubber was heard of, they had enlarged and reduced impressions, ordinary india-rubber being employed, but these had not the clearness and sharpness of line of those exhibited that evening, from the substance employed being less manageable. He considered any step in this direction was deserving of the highest encouragement.

Mr. Rutley, in reference to the photographs stated to be taken on stone or metal plates, wished to know how far Mr. Collins had been successful in producing impressions from them.

Mr. Collins called attention to a photograph taken on the previous day, which was not a very favourable one for photographic operations. That was a photograph on a glass negative, which was printed off on to the metal plate, from which the picture exhibited was obtained.

Dr. Caplin expressed a high opinion of the merits of this process. He thought that when certain good results were shown, it was unfair to ask why more was not done. This was, in his opinion, an unfair mode of dealing with any new invention or discovery. They should take it on its own merits, and not seek from it things which the inventor did not assert it was capable of producing.

Sir Thomas Phillips (Chairman of the Council) said, interesting as this discussion had been, he thought the time had arrived when it must be brought to a close, and the duty seemed naturally to devolve upon him to ask them to express their thanks to Mr. Collins for his paper. It seemed to him that the process was a very ingenious one, and great interest had evidently been excited by the manipulations of it, as shown that evening. The chairman, who was so well competent to judge of the merits of the invention, had told them it was one of great value, and that it was effectual for its objects; and although it might be true that certain portions of the process had been adopted before, with no great amount of success, Mr. Collins's merit was not the less, since he had, by his ingenious arrangements, rendered the invention really practical. This appeared the first really successful effort of the kind, and they must, therefore, award to Mr. Collins an expression of their sense of the value of his process. It had been said by one speaker that it would have been more satisfactory to some persons present, if the subject had dealt more with art, and less with the lower and more grovelling consideration of the interests of commerce. No doubt there were minds which would prefer to regard the subject from that point of view. It would be very gratifying if this invention contributed to the extension of art itself; but that would be asking from Mr. Collins that which he did not profess to do. In his (Sir Thos. Phillip's) judgment, it was a very great recommendation of the invention of Mr. Collins, that it provided for the multiplication of really accurate copies of works of art, at a price available for the masses. He thought, with their excellent chairman, that in an educational point of view, the invention was of great value. Pictures of the first class, which could only be possessed by the few, would, by the dissemination of cheap copies, now be the means of promoting elevated feelings and improved taste amongst the community at large. More works of art would thus be accessible to the great masses of the people, who had very little time to spare from their business occupations for the cultivation of their minds and their own self-improvement. It was of great importance that they should have the advantage of studying such objects of art as were calculated to improve and not to deteriorate their tastes. Therefore, he held this to be a valuable invention, as it enabled them to multiply, at a very small cost, those productions which now only afforded gratification to the higher classes of the community. He ventured, therefore, to ask the meeting to do what he was sure they would do heartily, namely, to express to the gentleman, who had conquered no common difficulties, the gratification they had felt at hearing from him the clear and lucid explanation of the process by which these results had been brought to pass.

The Chairman, in putting the motion, wished to state that he was at present engaged in etching a large plate, containing a multitude of figures. The prices of the proofs and prints would, of course, be such as were beyond the reach of the poorer classes of society; but he intended, as soon as these were gone, to have impressions taken by Mr. Collins's process, so that there might be an immense circulation at such a price as the poor man could afford to

give. He mentioned this, not as a notice of his own work, but to show that he thought so well of Mr. Collins's process as to contemplate its adoption.

The vote of thanks was unanimously passed.

The paper was illustrated by a large number of sp mens of enlarged and reduced prints, maps, &c., and the machine described was shown in operation.

The Secretary announced that on Wednesday evening next, the 12th inst., a paper, by Professor Leone Levi, " On Italian Commerce and Industries," would be read.

ARTISTIC COPYRIGHT.

A question of some importance to Art and public morals arises out of the growing practice of copying modern pictures in our Public Galleries. If any one will visit the South Kensington Museum on what is called a " Students' day," he will find the Galleries containing the Vernon and other gifts, crowded with men and women, copying the pictures of that collection. It is not as students that they are so employed, but simply as manufacturers. Some persons seem to assume a monopoly of the right of copying certain pictures, especially Landseer's; and so ostensible is the purpose for which these copies are made, that thay have been seen marked for sale with the prices attached to them. These copies are sold to dealers who dispose of them in many cases to the ignorant as originals, or *replicas* by the artist; and thus the State is to a certain extent made the encourager of fraud. Such a result cannot be considered as a legitimate object of a Public Gallery, and the Trustees of the National Gallery ought, if possible, to take effective measures to prevent the practice. It cannot be defended as being of the slightest utility to the promotion of Art; on the contrary, it leads to consequences which are a serious damage to it. It may be doubtful whether permission should be granted to copy any modern pictures: certainly not within the lifetime of the artist, and not for a long period after his death. And even when a copy is permitted, the copyist might be prohibited from making more than one copy. There is more than one person who seems to get a living by copying Sir Joshua Reynolds's " Age of Innocence."

There are many interests concerned in a proper treatment of this question; the interests of Art itself, those of the artist, and those of the public,—besides what is the proper course for the Government.

LEEDS MECHANICS' INSTITUTION.

Distribution of Prizes and Certificates.

The *soirée* of the Leeds Mechanics' Institute and Literary Society, under the presidency of Lord Palmerston, took place on Friday, the 26th October, in the Victoria Hall. The hall presented a very brilliant appearance; its powers of accommodation were thoroughly exhausted, and half of the numerous audience were ladies. On the platform were Earl and Countess Fitzwilliam, Lady Palmerston, the Dowager Countess of Essex, the High Sheriff, the Marquis de Fontevielle, the Right Hon. W. Cowper, Mr. and the Hon. Mrs. Denison, Sir P. and Lady Fairbairn, Sir J. Kay-Shuttleworth, Sir John and the Hon. Mrs. Ramsden, Admiral Meynell, Mr. Crossley, M.P.; Mr. Baines, M.P.; Mr. Titus Salt, M.P.; Mr. G. S. Beecroft, M.P.; and Mr. Monckton Milnes, M.P.

The Secretary of the Institution read the Report, from which it appears that by the operations of the Institute very nearly 5,000 persons are directly benefited. There are 1540 members and subscribers to the Institute. In the evening classes (adults) 149; 100 pay fortnightly, being in the receipt of weekly wages. Boys' and girls' day-schools, 250. Pupils receiving instruction from the School of Art, 2,979—total 4,918. More than 800 out of the 1,549 members are persons who are in the receipt of weekly wages. The 2,979 pupils taught by the art masters, with the exception of about 200 pupils, are all children belonging strictly to the working classes. The members and subscribers to the Institution enjoy the use of a library of 11,600 volumes, the right to attend about thirty first-class lectures on subjects connected with literature, science, and arts, and a news-room where seventy-two of the leading periodicals and forty-two of the best London and provincial newspapers are taken in. All these advantages are enjoyed by the members for a subscription equivalent to from 1½d. to 3½d. per week. In the class department young men are offered instruction, at proportionably low rates, in chemistry, mathematics, grammar, French, and German. In the School of Art, instruction is given in mechanical drawing, modelling, drawing from the living models, and in free-hand drawing. All this important educational advantage is derived at a cost of less than £1,300 per year. Yet, great as are the advantages conferred by the Institute, the Committee feel that they are inadequate—that they do not sufficiently fulfil the proper objects for which Mechanics' Institutes were originally established, nor satisfy the demands of the age. While delighted to see the lecture-hall and the news-room crowded, they feel that it is to the classes that we must look for the more solid and permanent results of such an Institution. Unfortunately, the building at present possessed for the Institution is exceedingly deficient in proper class accommodation, it having been constructed originally as a music saloon. The Committee have resolved to appeal to the liberality of their fellow-townsmen, and gentlemen interested in the prosperity of the district, to aid them in erecting a building worthy of the town. They have provisionally secured a very eligible site of land, and, owing to the kind liberality of John Calverley, Esq., on very favourable terms. They have also obtained designs from several most eminent architects, which will be on view for a short time in the town-hall. It is intended that the accommodation shall comprise a reading-room and library; a lecture-hall capable of seating 2,000 persons; class accommodation for 800 pupils; a gallery of art eighty feet by thirty feet; a school of art for 300 pupils; and a school of science and chemical laboratory for 100 pupils. The estimated cost of the building is fixed at £16,000, which sum will, of course, include the price of the land. The total amount already received in aid of the New Building Fund is £5,000.

Lord Palmerston said he wished to express the high gratification and pride which he felt at having been allowed to preside at a meeting so numerous and so distinguished in one of the first towns of this great empire, and for a purpose so honourable to the town to which it related. In addressing an audience upon the subject of mechanics' institutions, it would be ungrateful and not becoming to forget those distinguished men who were the founders of this system of instruction—Dr. Birkbeck and Lord Brougham, names which were engraven in the grateful memories of all those who, in different parts of the United Kingdom, had derived benefit from these institutions. Of all the instruments for the diffusion of knowledge, there was none, perhaps, that excelled mechanics' institutions. Some objections, nevertheless, had been taken to them. People said that the working classes, for whose use these institutions were mainly intended, were too much occupied in daily toil to be able of an evening to bring their minds with the freshness requisite for improvement to study of any kind. That was a great and fundamental mistake. There was nothing more natural to the human mind and the human body than the combination of labour and study; and those men who had passed the greater part of the day in laborious employment found recreation and relief when in the evening hours they were able to enjoy the pleasures of literature, or to improve their minds by the acquisition of scientific knowledge. He was glad to see by the report

that this institution would have the means of imparting to its members learning of the most various kinds, adapted to all callings and fitting men for all employments. After speaking generally of the advantages that were afforded by the Library of the Institution, and the facilities thus given for the pursuits of Literature and Scince, Lord Palmerston proceeded to speak of the great assistance afforded by lectures in the acquirement of knowledge. The lecturer was to the student what a good guide was to the man who for the first time entered a city or a country the geography of which he was unacquainted with, but who knew there were certain points which he wished to arrive at, and who, if left to his own unaided wanderings, might spend much time and much labour in arriving at the object of his pursuit. But the guide and the lecturer took the traveller and the student by the hand, led them by easy and pleasant ways to the ultimate object of their search, and placed them in possession of the end, and of that instruction which they were endeavouring to attain. There was however, one defect in lectures. The knowledge which a man acquired by his own unaided exertions, working it out by books, by experiment, and by reflection, remained fixed in his mind, because the trouble he had taken to acquire it implied deep attention to every stage of the process. They all knew that the memory was retentive in proportion to the degree of attention which had been paid to the object stored in it, and, therefore, although lectures did lead men easily to useful results which were usually only acquired by deep and intense study, still the student, at the end of a course of lectures, if he had not been interested in the subject by knowing that it bore upon his active pursuits, might carry away permanently but little of what he had heard. Then stepped in that principle of recent establishment, but of most valuable effect—the Examinations. Then came the examiner—to whom the student voluntarily submitted himself, knowing that if he obtained a good certificate upon examination, it would be a proof of ability and attainment which would be useful to him in his calling, and this led to really earnest and persevering study. Thus the three sources of instruction—the lectures given in general, the subsequent study carried on by the individual, and the test put to him by the examiner—completed a system of instruction which, if pursued, as no doubt it would be pursued, not only in that town but in other parts of the country, must tend rapidly to improve the intellectual condition of the people of the United Kingdom, and by improving their intellectual condition must add to their happiness, and promote the greatness and prosperity of the empire to which they belonged.

The noble lord then proceeded with the distribution of the prizes and certificates awarded by the successful candidates in the examinations of the Society of Arts, addressing a few words of encouragement to each as he handed him the reward. In the same way he delivered the prizes and certificates obtained under the Oxford middle class examination, as well as those won by the boys of the school attached to the Leeds Mechanics' Institution, under the middle class examination conducted by the University of Durham.

The Secretary then read a list of the subscriptions, including £50 from Lord Palmerston, £500 from Mr. William Beckett, Mr. James Brown, M.P., £250, and many other contributions of a similar amount. The total of the sums announced was £5,005.

Sir James Kay-Shuttleworth, Bart., moved the first resolution, as follows:—"That the extension of science and art instruction among the middle and industrious classes is one of the most effective methods of raising the social position of the people."

This was seconded by the Right Hon. W. Cowper, who said he looked on mechanics' institutes as a system of elaborate machinery by which persons brought under its influence might be raised in the social scale, made more useful in their lives, and altogether rendered more worthy of the calling which they had embraced. The great work of the present day was to popularise adult education as we had popularised the education of children, and it was because these mechanics' institutes were admirable means to that end that they ought to receive support and assistance like that of which the present meeting was so noble an example.

The resolution was carried unanimously.

Mr. Edward Baines, M.P., proposed the next resolution:—"That while the Leeds Mechanics' Institution and Literary Society has conferred considerable benefit upon the town and neighbourhood by its library, school of arts, classes, lectures, &c., it has been unable fully to carry out the important educational objects for which it was originally established, from the want of adequate accommodation." He said that during the thirty-five years that institution had existed he had known many of the advantages which it had conferred on individuals and upon the town generally; but the accommodation provided had been miserably inadequate. They had now but one good room, which had to do duty as library, reading-room, and lecture-hall. The classes were wretchedly accommodated. It had been shown by experience in Manchester and elsewhere that as better accommodation was provided the number of members had increased; but here they had positively retrograded, from a want of proper conveniences. He said most confidently that there was no reason why the Leeds Institute should not have 3,000 members instead of 1,500. He believed that Manchester, which had recently built a noble hall for its Mechanics' Institution, had gained at least double the previous number of members when the accommodation was made adequate. It was the duty of Leeds to make its institution a model for all the Institutes comprising the Yorkshire Union—instead of 150 members in the evening classes, they might get 800, as Huddersfield had done; and as there was no natural limit to the success of such an institution, they ought to set themselves vigorously to do the great work which undoubtedly stood before them.

Sir John Ramsden seconded the resolution, which was carried.

Mr. G. S. Beecroft, M.P., then proposed the following resolution:—"That this meeting has heard with pleasure the proposal to erect a new building for the Leeds Mechanics' Institution and Literary Society, which will provide accommodation for all its present departments, and include schools of art worthy of the town. Further, the meeting pledges itself to render all possible aid to the subscription now making for the purpose."

This was seconded by Mr. Crossley, M.P., and carried.

The Mayor of Leeds having taken the chair,

Mr. William Beckett proposed the thanks of the meeting to Lord Palmerston, for presiding. The noble lord's visit could not fail to raise the institution in public estimation, and he assured his lordship his visit to Leeds would long be retained in their grateful recollection.

The Rev. Dr. Atlay (Vicar of Leeds) in seconding the vote of thanks, referred to the circumstance that his father, when at Cambridge, at the commencement of the present century, served under his lordship, who was then a captain in the gallant volunteers of that day. This showed that at that period his lordship was as willing to devote himself to the welfare of the country as he had proved himself ever since.

The vote of thanks was passed with much enthusiasm.

Lord Palmerston having acknowledged the compliment,

On the motion of Sir Peter Fairbairn, seconded by the Rev. Alfred Barry, the thanks of the meeting were given to the visitors.

The resolution was acknowledged by Earl Fitzwilliam and Mr. Monckton Milnes, M.P.

The proceedings then terminated.

Home Correspondence.

MR. BUCKLAND'S PAPER ON THE ACCLIMATIZATION OF ANIMALS.

Sir,—The comprehensiveness of the subject so ably introduced by Mr. Buckland, renders it difficult to do more than offer hints and suggestions in corroboration of the views advanced by him. Although the subject was partially ventilated by a number of useful remarks from various speakers, yet there is still a wide field ungarnered. It was cast upon England, as somewhat of a reproach, that France had been before her several years in this systematic acclimatization question. But, besides the reasons advanced for this by Professor Owen, one cause for this zeal on the part of France is to be found in the great dearth of animal food in that country as compared with the United Kingdom. The average consumption of meat per head in that empire, some fifteen or twenty years ago, was calculated to be only about 26lbs.; and although, since the free opening of the butchery-trade, the proportion is now somewhat larger, yet, as compared with the consumption of our own well-fed population, it is lamentably deficient. M. St. Hilaire, the President of the Paris Acclimatization Society, is the well-known advocate of hippophagy, whichhas been called in as an adventitious aid to the restricted supply of animal food. One great cause of the deficient supply of meat in France is —the extensive and early slaughter of calves, which the farmers are too poor to keep till they attain a mature age, another the small weight of the stock slaughtered, and the general consumption of cow-beef. That there are abundance of wild animals available for food in many countries, and which are so used by large numbers of people, is well known, as I had occasion to show in a little work which I published a few months ago on "The Curiosities of Food." But whether many of these viands would be acceptable to the English palate is another question. That very many of the wild animals, so abundant in different quarters, could be transferred to some of our colonies and utilised, I fully believe, even if, as was urged, we have not room or necessity for them here. The American bison is met with in immense droves on the prairies, and there are still countless millions of them traversing the length and breadth of great parts of the American Continent. I doubt whether the domesticated horned cattle of the United States equal the numbers, while they must fall considerably short in weight, of these wild ones. How useful might some of these prove if carried to our Colonies for their flesh, and for their dressed skins—the well-known "buffalo robes."

Take, again, the European and American elk; these are usually considered by naturalists specifically identical. It is probable, however, that they are distinct. The flesh, whether fresh or dried, is excellent, and tastes like beef, while the tongue and nose are regarded as great delicacies. This elk has been domesticated with great success in Maryland, Virginia, Washington, New York, and other States; and if they have thus succeeded, why could they not be introduced to Newfoundland, and many other of our colonies, where there is abundance of waste land? The moose is being transferred in America to parts of the northern States, and the buffalo to other districts. Then there is another useful beast worth notice. I mean the yak, of Asia, to which even the Americans are turning their attention. It would be suited to some elevated regions. It is a useful beast of burden, strong, surefooted, and capable of carrying a load of 150 lb. to 200 lb., while it produces abundance of rich milk, and it may be purchased in some of the hill regions for 24s. to 30s. The soft fur and hair are made into useful fabrics, and into tents and ropes, while the bushy tail has always been held in estimation by the higher classes for chowries or fly flappers, and as an emblem of authority. There is also the joobul, a mule or cross between the yak and the hill breed of cattle, which is more hardy, will carry a load of 100 lb. to 150 lb., and can be purchased for £2 or £3.

As regards wool-bearing animals, the success of the alpaca was pretty fully borne out by the observations made by Mr. Ledger. The discouragements and difficulties incurred by those concerned in its introduction were not at all greater than attended the first propagation of the Australian flocks. In the year 1801, about twelve years after the first convict settlers landed, New South Wales had 7,000 sheep.

Sydney Smith, in the *Edinburgh Review*, in 1803, sketches, in a comic vein, the probability of Botany Bay turning out a second North America, and declaring its independence of the mother country on account of a tax on kangaroo skins; and he goes on to remark, that "the Government of the colony has begun to turn its attention to the coarsest and most necessary species of manufactures, for which their wool appears to be extremely well adapted." Little did that eminent wit imagine, when he penned his half-ironical description of the resources of the new colony, that, in the course of half a century, New South Wales would possess a world-wide celebrity for the production of wool of the finest quality; that, besides stocking half-a-dozen neighbouring colonies with sheep of a noble breed, she would possess within her own limits upwards of eight millions of the same, and export wool to the value of a million and a half yearly.

There is no reason why, with the great variety of herbage produced in Australia, and its adaptation as shown to the growth of the alpaca, it should not have a large amount of produce of this kind without decreasing the proportionate quantity of wool. I find a calculation made in the Sydney papers of the probable growth of the alpaca flocks in 50 years—a long time in the life of a man, a short period in the history of a people.

Commencing in 1861 with 280 animals, of which 220 are females, and making deductions of a liberal nature, according to the present ratio of increase there would be, in fifty years, 9,760,000 head, the wool of which (an average of 7lb.) at 2s. per lb., would amount to the sum of £6,832,000 per annum. Then there are the wool-bearing goats, which are receiving attention, some having been introduced into the Cape Colony and South Australia; while in the United States, the Cashmere goat has been acclimatised in Georgia, South Carolina, Virginia, and New York.

With respect to small sheep, as alluded to by Mr. Buckland, I may call attention to a letter from Mr. Moorcroft, cited in the late Dr. Royle's work on the "Productive Resources of India," wherein he states that he had "purchased and made arrangements for the keep of upwards of a hundred head of a race of sheep, the smallest perhaps known, but which in fineness of fleece may vie with the Merino, under the advantage of a much hardier constitution and of a better carcase."

It was stated by Mr. Crawford that it had hitherto been found quite impossible to domesticate any other member of the equine race than the horse. Now this is scarcely correct. Some of the quaggas have been and can be tamed if attention is given to the subject.

Although the zebra is untameably vicious, there are two other species of quagga which have been broken to the saddle and to harness. They are docile and easily tamed, and during the governorship of Sir Lowry Cole, an Englishman drove a team of eight or ten into Cape Town, and sold them to the highest bidder. Those sent to Lord Derby were also, I believe, broken to the saddle.

In Southern Africa there are numerous troops of these quaggas, and they are moreover not subject to that destructive epidemic the horse sickness.

The introduction of new edible species of fish to different quarters, opens of itself a very wide field for experiment. Carp and chubb have already been introduced into Tasmania, as well as into the Cape Colony, and in view of the premium offered by the French for a new fresh-water fish for the waters of Algeria, might not the Gourami

(*Osphromenus olfax*), which has already been carried to Java, Mauritius, Cayenne, Martinique, and other quarters, and is spoken of as a delicious fish, prove the one suited for the purpose.

Among the *fauna* of Madagascar which it might be desirable to introduce into Australia, if practicable, is a bird whose mission appears to be that of destroying an insect which is a great nuisance in many colonies. Mr. Ellis made the acquaintance of this beneficent bird under the following circumstances:—

"Passing herds of cattle, either feeding or reclining on the grassy plains, I had noticed that they were always accompanied by a number of birds about the size of a pigeon, but in shape more like a stork, having long legs and neck. These birds seemed to be the constant companions of the cattle, attracted by the flies or other insects about the oxen, and passing in and out amongst, and even upon them, when grazing or lying down, with the most perfect freedom and confidence. On inquiring of the natives about them, I was told that they were called *vorompotsy*, white bird; or *voronte anombe*, literally, birds beloved by cattle, as they always followed the herds, and devoured the flies which tormented them. The number of birds was also proportioned to that of the cattle; if the latter were but few, they would be attended by only two or three birds; but, if the herd was large, there would be a great number of birds in companies amongst them."

Will none of those enterprising individuals who compass sea and land to supply us with canaries and Java sparrows, pay a visit to Madagascar, and bring us a few families of "vorompotsies," and add to the obligation they will confer upon the colonies, by making some experiments with a view to the domestication of so useful a bird? That man would deserve well of his country who should be instrumental in diminishing the plague of flies, and Mr. Ellis indicates that this is not altogether impracticable.

I can scarcely expect to occupy more space in the columns of the *Journal* at present, although the subject is a most fertile one, and one which, in several papers read before the Society, I have not failed to advert to.

I am, &c.,

P. L. SIMMONDS.

8, Winchester-street, S.W., Nov. 29, 1860.

Sir,—Of a surety Mr. Crawford is heterodox anent the matter of venison. He decries all except the fallow deer of England, the favourite food of Robin Hood, which was by no means the stall-fed, muttonified, bastard venison which passes under that name in the "categorie of victuales" orthodox amongst aldermen. Red deer, Mr. Crawford acknowledges, is high-flavoured, but is only good when treated with mutton fat in lack of fat of its own.

In hot countries deer do not grow fat, it is true, but for all that, in a hot summer on the Pampas of La Plata, fallow deer venison was and is incomparably better food than bull or cow, or horse or ass, or mule or pig, or puma or ostrich, aye, or guanaco or mulito—a species of the armadillo—and I have eaten of them all without bread, salt, or vegetable, and that is the true way to test the qualities of meat. Guanaco and vicuna are next to the deer, and they are no fatter for the most part.

When Mr. Crawford next lights upon deer or antelope, let it be "brittled" in the following fashion:—Take out the four muscles in and outside the spine, from head to tail, in long strips, analogous to the "saddle" in mutton and and the "lumbar" cut in beef. Put these strips, without fat, to soak in lemon juice for twenty-four hours, then oil them all over with the best olive oil, tie them up in a roll, roast them, and baste them continually with oil. Make gravy from the bones. If Mr. Crawford and all his friends dissent from that roast when they have proved it, why, then, let them turn it over to Mr. Buckland and me. I maintain that venison well used is the king of all flesh food, and will breed better brains in a man's scull than all the beef and mutton hitherto invented, and will breed fewer disorders in his body. It was the deer, no doubt, that imparted its raciness to Robin Hood and his merry men. I entertain a profound respect for venison pasty and Burgundy, as well as for pork pie and Port, but the pasty was clearly only a contrivance to make the venison portable, and lemons and olive oil must have been scarce in the greenwood in Robin Hood's time, wherefore was so much lusty rejoicing when the foresters lighted on a "hart of grease."

And not to venison only does the lemon and olive oil roast apply, but also to beef and mutton. Cut away the fat both bovine and ovine remorselessly, and treat the lean with the lemon and the olive, and few men there be who would not thenceforward consider it "savoury meat such as their souls loved." I do not mean that fat meat is not better than lean, but that it is the muscle without the fat that builds up health and strength. Roast meat, without bones, which latter should be used up to make strong gravy for the roast. But let Mr. Buckland go on and increase our stock of venison, by all means in his power, and, Mr. Crawford notwithstanding, it would be a marvellous good food to feed our volunteers on, making them all veritable Robin Hood's men. "Dry," indeed! why what is dryer than a potato? But don't we go to the cow and get fat second-hand to cure the dryness? And what would turkey be without the pork fat? The best food without good cookery is nothing worth. Once upon a time, a bumpkin poacher, wishing to seduce a bumpkin non-poacher, called on him with a present of a hare, warm from the slaughter, telling him to cook that, and see whether it was not a nice dinner to be had for nothing. A week after he called again on Hodge to inquire how he liked the dinner. "Didn't loike hit at all," exclaimed the recipient. "Well, man, how did e cook him?" "Why, biled'n with turmuts, to be sure." *Exit hare-giver.*

Mr. Crawford's error was of the same kind. The fresh-killed deer in India had no time to season, and it was wasted, like the visitor's appetite at an alderman's feast, on a leg of mutton. If Mr. Crawford be tried by a jury of venison-eaters they will bring in a verdict that his evidence is "not proven." It is upon a par with that of the man who, in the lowest depth of ignorance, "biled a fresh hare with turmuts."

The Quiriquinchis, *i.e.*, the armadillo tribe, produces in the Pampas one variety, called in country nomenclature the mulito. It is in form and colour very similar to what we call the woodlouse, but about twelve inches in length, burrows in the ground, and runs quick, digs rapidly, like our mole, and gets out of sight. It is good sport to ride after them in the grass of the open plains, and knock them down with a whip. This animal bears frost as well as sun, feeds cleanly, and would probably thrive in England as well as hedgehogs and guinea-pigs. For eating it is delicious, far more so than sucking-pig, certainly than Pampas sucking-pig, whose favourite suction is dead horse; beyond all doubt the favourite food of pigs' choice, when wild on plains the porcine savage runs.

The following is an extract from the traveller's Journal:—"Fine morning, saw a mulito in grass; gave chase, knocked him over with sword; twelve inches long, shape like woodlouse; carried him four leagues, tied to saddle by one leg; disembowelled, put him on his back, in hot embers of horse dung, covered him over, half an hour done. Belly skin came off like crackling, back shell capital kind of tureen. Two of us ate it up, and wished for another. Didn't we hunt them after that first taste. * * * Know now why Moses prohibited pork in Judæa. Fell in with drove of some 400 swine—savage beasts—looked at three of us, as to say, 'You let us alone, and we'll let you alone.' Horses gave superiority over numbers, and horse-pistols decidedly more effective than tusks; so skirted the drove, or should say herd, for they wouldn't drive at all, while their leaders, charged with the foam over their tusks—grunting furiously—kept horses just a-head, and raked them over stern. Dropped some forty in their tracks—selected three—a full-sized boar, a young boar, and a small

pig; put a lazo each round necks, and dragged away, two leagues, to camp. On arrival, sides of pigs worn through to bone. Cut in half—put down to roast. When done—knives out, and meat into mouths, which only closed once. Mouths opened and ejected unsavoury morsels—shouts of laughter from waggoners, who watched the green-'uns, enjoying surprise. Train-oil certainly not nice, but much preferable to Pampa pig. Mem.—Not to eat pig in strange places again."

As the Americans say, that was "a caution." Yet this same pig, caught and kept from all food but maize, which he will sulk at for three weeks till his ribs look thin enough—this same pig, after six or eight months' rations of maize, becomes good practicable pork. But Heaven help the passengers in an ocean craft, whose skipper has provided them with preserved, fresh, or salted pork from the Pampas direct. It has been said that "all flesh is grass;" but Pampas pig is guiltless of grass, and is only dead horse at second hand—flesh—but flesh "fishified" with a flavour of dead whale, possibly acceptable in Esquimaux land, but quite unbearable where the climate is sultry.

It is humiliating thus to dwell on the process of burying dead animals in our stomachs, but it must go on till the chemists shall teach us how to endow a quartern loaf of bread at pleasure with the separate qualities of fish, flesh, fowl, and fruit. Bread is the "staff of life," and contains all the elementary principles; but without change of flavour it palls on the appetite. Whence shall come the aromas? Had Charles Mansfield lived, he would probably have worked out the problem, and then indeed the proverb might have a truth "all flesh is grass," wheat being only a grass with its germinal parts exaggerated. I am, &c.,

COSMOS.

Sir,—Last evening so many able speakers occupied the allotted hours of the meeting that the few impromptu remarks which occurred to me at the time, and which were expressed after the members broke up, I now put into writing, at the earnest suggestion of a member who was anxious to obtain information concerning the breeding of oysters.

My practical experience can be told in a few words:—

On the east bank of the Hudson River, twenty miles from the city of New York, might be seen every April and May a number of small boats dredging for oysters, at about a stone's throw from the shore. The size thus obtained would average two inches in diameter. These were then taken to a place twenty miles lower down, and at ebb tide planted in beds, where they remained till autumn, when they were again collected for market, having during the intervening four months quadrupled their size and become rich and luscious in flavour. I have seen as many as thirty boats at a time thus dredging, yet each succeeding spring would find a renewal equal to the exhaustion of the previous season; in fact, the fishermen assured me that the increase was mainly owing to their "stirring them up." As my property extended at this point for about a quarter of a mile on the river, and as I had owned it for more than twenty years, my information is derived from a long experience.

The flavour of the young oyster was something like "English natives," but after the transplanting into more genial waters, and when they were brought to market, they possessed such deliciousness of flavour as to command the highest market value. A few transferred to this country would doubtless prove a most desirable benefit.

I was asked by another gentleman if they would be suitable for the Cape of Good Hope.—I think not; but those found in Florida would, for at the latter place the seasons are hot, like those at the Cape. In the lagoons and estuaries of Florida, billions on billions are met with, of the finest kinds, and of the most delicious flavour—white and round and marrow-like, but they are of a different form to the northern oyster, being very oblong; I have a bunch of them by me.

To give an idea of the immense quantities of these bivalves in the peninsula of the Gulf of Mexico, I have but to state that the rivers and lagoons, at very short intervals, for hundreds of miles, are planted with oyster-shell mounds, some of which are not less than 500 yards long, ten high, and fifty broad. In fact the only high ground to be seen in this region—to use an Hibernicism—is composed entirely of oyster shells.

A fisherman of St. Augustine informed me that this fish did not live more than two years, and that it obtained nearly its entire size the first year, but after the spawn had attached itself to its home, the shell formed very rapidly.

Here is a theme for a long article, but I cannot spare time to write more at present. These few lines, however, are written to show myself a willing co-worker in the objects the Society aims at making useful.

I am, &c.,

GEORGE HARVEY.

16, Rathbone-place, W., Nov. 29, 1860.

Sir,—I regret the learned professor in the chair found it necessary to close the discussion on Mr. Buckland's interesting paper on the acclimatisation of animals, ere the question so frequently put by him, Why have we not this animal? Why have we not that animal? had met with a responsive—Because Agricultural balance-sheets and railway audits are such practical annoyances to the most ardent scientific theory. Let Mr. Buckland show the value per acre of land any member of the deer family would yield, even if their race were endowed with the most aldermanic tendency to obesity.

The purely Welsh sheep ranges over vast tracts of land for a sufficiency of food, and his descendants upon removal, are not to be domesticated or hedged up in fields in one generation. What value per acre does his family yield?

Acclimatisation, as far as this island is concerned, presents few difficulties with any animals it is desirable to introduce. Profitable domestication has many. Man in this island appears to have been busily engaged in extinguishing many races of animals to make room for himself and those friendly animals which yield a high rent for the land by the commercial value of their products during the interim period of propagation.

The horse, by its labour; the cow, by the dairy; the sheep, by its wool, &c.; and equally profitable attributes must be shown in any animals sought for future domestication. I am not of those who think there is nothing left to be done, nor yet entirely thankless for the experience and industry of those who preceded us, but from the latter half of the paper (which I had only the pleasure of listening to) and the discussion that followed, I believe the question of profit and utilisation was not sufficiently dwelt upon to prevent disappointments and profitless if not mischievous introductions in the search for novelty.

I am, &c., HENRY WEBBER.

1, Brewer-street, Golden-square, Nov. 29, 1860.

Sir,—Having had considerable experience on the subject of your correspondent's (Cosmos) letter in the last *Journal*, I beg of you to let him know that the practice he would recommend is unfortunately too well known, both in this country and on the Continent, to require any further inquiries by scientific men. I say "unfortunately," as I know from experience that meat and fish deodorized by the process now so well known, produce most acute disease. Meat once putrid, and treated in this way, cannot be sold without the purchaser knowing it, therefore it must be disguised in some way; and when used as sausages, &c., must be mixed with other meats to prevent its being nauseous.

Putrid fish can only be effectually deodorized in cooking. Flat fish, such as turbot, sole, and skate, are the best; the fat of round fish, like the salmon, and the green fat of turtle, turn to a rancid oil, like that from the blubber of the whale, although the flesh is made perfectly sweet. Thus it is with the skate which the English fisherman sells to the French one, and whose transport from Boulogne to Paris, if not marked by a stream of phosphoric light, is sufficiently known by its odour to those who travel in the same train. Fish and meat, once putrid, when cooked separate from the bone, and all the gelatinous parts dissolve in the water; and it is quite impossible to make a firm, stiff jelly from either, however strong it may be made. The gluten, in the process of the putrid fermentation which has taken place, seems to have undergone some chemical change which I do not understand, but which, when it is cooked, leaves the fibrine by itself, tasteless, and without nourishment; being tasteless, by an experienced "artiste" it is soon rendered palatable; hence, "Turbot en vol-au-vent," or "au gratin," "Raie au beurre noir," "Sole en matelote," &c. The appearance of the meat when cooked is similar to badly-prepared meat, in hermetically sealed cannisters, and it is therefore only good in pies, stuffing, and where the flavour is masked by a thick sauce. When roasted it never produces that beautiful crust known as *osmazone*, and one is required to be produced on it by "basting and dredging," but nothing will give it back its true flavour. Rotten cheese may be deprived both of smell and flavour, but it is impossible to bring it back to its solidity. The unwholesomeness of fish, veal, pork, and other white meats that have been putrid, when partaken of by children and dyspeptic persons, I can vouch for; the agony they produce resembles that from some known poisons, and, with all the remedies at hand, it lasts some time. Pepsine I find the best to allay this irritation of the mucus membrane of the stomach. I have made it a practice for some years to try upon myself and my youngest children the effects of various diets, and I would advise your correspondent "Cosmos" to do the same, and try the diseased meat he speaks about; but not to let the persons he tries it upon know what it is, for the imagination has a great effect upon the stomach.

It is quite true that we have not come to the end of our food chemistry; and I should like to know from some of your able correspondents what would be the effect upon the human system of partaking of a meal of beef that had been poisoned from eating laurel. Within these few days I saw in the neighbourhood of London three Welsh heifers drop down dead on the road from that cause. They were immediately stuck in the throat by a passer-by, and they bled. They were then sent up to Whitechapel-market to be dressed and sold. I was curious enough to go and see them, and, to all appearance, the meat was good. Is such meat or fish destroyed by poison unwholesome?

I trust that we may succeed in the acclimatisation of animals for the purposes of food, and that we may shortly have in our bills of fare the eight-banded armadillo boiled and stuffed, with cream sauce; but I hope we may never lower ourselves in the scale of human nature to the level of the Esquimaux, by eating diseased flesh and putrid blubber.

I am, &c.,

G. WARRINER,

Instructor in Cookery to the Army.

BREAKWATERS.

Sir,—The discussion upon this subject has been prolonged for years, and has been before the Institution of Civil Engineers, without the smallest prospect of being brought to a satisfactory conclusion.

The cause of this anomalous state of things is, that all the engineers, inventors, and patentees who have devoted their talents and energies to this matter, have totally lost sight of nature, and would seem to be only intent upon devising works solely to benefit contractors, by the enormity of constructive workmanship they endeavour to introduce into their respective schemes.

In order to proceed to the construction of a breakwater that will effectually resist the force of the Atlantic Ocean, when urged to the utmost fury on our coasts by storms and hurricanes, we have only to lay down a series of rocks in the proposed line, each rock being alone sufficient to resist immoveably the shock of the heaviest breakers. Let them be 50 or 100 tons each, no matter what may be the size of block required, because with larger insterstices a less amount of tonnage of stone will need to be deposited, and so render the work less costly.

The actual minimum magnitude of the rocks required to resist the force of the sea may be readily ascertained by the examination of any exposed rocky coast, where the smallest loose rock that remains unmoved will represent the desired maximum size; and let it be here observed that there can be no possible objection to the above-mentioned large interstices, because the sea will either close them up with sand and wreck, or it will not. In the first case the work will become solid, and in the second it is well known that no rough water can pass through that would inconvenience the smallest open boat. Also, that the nature of the bottom is not of the slightest importance, for our only work will be to pitch down rocks on the course of the proposed line until they rise above the highest known water-mark.

As under this system of forming breakwaters all lesser rocks and stones must be rigidly excluded, a self-evident objection arises, which has been personally laid before me by the contractors for such works.

The contractors say, that in quarrying such large blocks a considerable quantity of small stones and rubble must inevitably be produced, and if they were not allowed to deposit the said rubbish in the breakwater they would be unable to charge for this waste. The answer is clear—that this is *their* business, and a breakwater is not to cost the nation four or five times the amount necessarily required, wholly and solely for the benefit of the contractor. Besides, if contracts were so worded as to exclude their rubbish, the contractors would speedily find the means of quarrying large blocks with a small amount of inferior stuff, the whole of which would have some market value for other purposes, the contractor's object, however, being to get rid of it at breakwater prices.

Cherbourg.

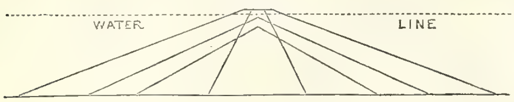
A series of attempts were made during the last century, and continued at intervals ever since, to construct a breakwater in this harbour, without success, owing to the unfortunate infatuation of the French engineers, who imagined that the hulk of an old ship, or even a framed caisson, filled with rubble stone of all sorts, would resist the effects of the ocean in a storm. In consequence, this noble roadstead has been permanently injured by the dispersion of enormous quantities of rubble all over the harbour. When twenty or thirty large caissons went to pieces in the first storm, the engineers laid down twenty or thirty more, and so on until the harbour and roadstead are now nearly ruined. The forts and batteries since built on the ruins of the piles of rubbish spread abroad by the action of the sea, are cracked in all directions, and the damage is now almost irreparable.

Plymouth.

The breakwater in this Sound was commenced many years ago, under the auspices of the late Messrs. Rennie and Walker. In this case, also, a very large portion of small stone—which in a work of such magnitude may well be called rubble, was deposited together with some of a larger size, the smaller being under one-quarter of a hundred, and the largest about twelve tons. This at the bottom and near the centre of the mound, where it can be of no possible use. In consequence of the smallness of the larger blocks, and the immense quantity of rubble mixed up with them, under the false notion of producing a solid structure, the first great storm overthrew the estimated

section of the breakwater, which was represented by a nearly equilateral triangle, and converted it into an obtuse isosceles triangle, with the crest as much, or more, below the water line as it was previously above. Of course an enormous addition of rubble was then required to bring the crest to its former position. Successive storms produced the same effects, and still larger additions of rubble to make the work up. The following simple lines will show the various sections of the breakwater at different stages of the construction:—

Sections of the Plymouth Breakwater.



BOTTOM.

Many difficulties were met with in finishing this work, for every high tide, accompanied with southerly gales, constantly threw the top courses of rubble over into the Sound. In order to prevent this damage, the whole of the breakwater from below low-water mark had to be flagged with immense slabs of stone, cemented and cramped with iron and lead.

All these disasters would have been avoided by the use of large rocks alone, which can be readily obtained at the Oreston Quarries, of one hundred or one thousand tons each if required, and the cost of the breakwater to the nation reduced perhaps one-half, and more than half the time of construction saved.

Isle of Portland.

The cost of the breakwater now in course of construction in this roadstead has been increased to an incredible amount by all the ingenuity of modern science. There are no large blocks in this structure capable alone of resisting even a moderate storm, and all the rubbish of the quarries has been shot into and upon the body of the work, in order, as the officials tell you, to make solid work, whereas the smaller stones only act as rollers, which in any commotion will considerably help the knocking about of the larger blocks.

The whole of the materials are run out in wheeled trucks upon a perfect screw pile timber jetty, standing in six fathom water, of the most scientific and costly description, the simple plan followed by railway navigators being rejected as far too economical for the contractor's views of engineering.

In railway tips, the materials are run out on a rail or tram laid upon the back of so much of the work as may be complete at the time.

Very few of the blocks exceed the weight of three or four tons, while the poor quarrymen, with their own rude and simple appliances, have often moved out of their way and shot down the cliff blocks of useless "roach," of from four to eight hundred tons computed weight in one solid mass, a fact that puts an end at once to all supposed difficulties in moving such large masses of rock, especially in this case, where the breakwater springs from the land, and the quarries are at a high leve l above. No wheel trucks would have been required, and no return rail or tram on the back of the work.

Besides all these arrangements, which appear almost like expedients for unnaturally increasing the cost of this breakwater, a wide opening in the middle has been devised, ostensibly for the purpose of allowing fishing boats to come into Weymouth Roads without having to stretch round the extreme end of the breakwater. This opening, requiring two piers of solid masonry, will, of course, allow heavy seas to roll into the roadstead; but it has offered an opportunity for a brilliant display of scientific construction, as well as a vast increase to the cost of the undertaking, as the whole of the two piers is built with squared masonry under the diving bell, in six fathoms water, and, generally speaking, in a rough sea, so that the works have several times been carried away, and many lives lost.

As a naval rendezvous the Portland roadstead will, in my opinion, be nearly useless in time of war, as the enemy passing by, out of range, can count every mast, and ascertain thereby the exact amount of force therein concealed.

I am, &c.,

HENRY REVELEY.

Poole, Nov. 12.

Proceedings of Institutions.

Faversham Mutual Improvement Society.—The sixth annual meeting of this Institution was held in the Public Rooms, Faversham, on Wednesday evening, Sept. 12th. The President (Mr. F. W. Monk) occupied the chair, and after some introductory remarks, called upon the Secretary to read the report for the year 1859-60, from which it appeared that the number of members had increased during the year from 360 to 487, and would shortly exceed 500. Nearly £40 had been expended upon the library, and the circulation of books had very considerably increased. Amongst the works added to the library were copies of "M'Clintoch's Voyage of the *Fox*," "Arago's Astronomy," "Buckland's Geology," "Tennyson's Idylls of the King," "Russell's Diary in India," "Humboldt's Life Book and Travels." "Strickland's Queens of England," and "Humboldt's Cosmos." The thanks of the society were due to Giles Hilton, Esq., for a valuable present of books. The last lecture season had been a great success; the lectures were good; the average attendance large; and, although the price charged for admission was very small, yet a profit of between four and five pounds had been realised by the course. The annual soirée held in February last was attended by a large number of members and their friends, and the results in all respects were satisfactory. It had tended to unite the members in one common cause—the cultivation of social friendship and the furtherance of intellectual advancement; and it had in no way infringed on the ordinary funds of the society, as the amount realised by the sale of the tickets more than covered the cost of the entertainment. The attendance at the ordinary meetings had not been large, owing mainly to the inconvenience of the society's room. At those meetings the following lectures and readings had been given:—Mr. Webb, of Eynsford, on "The Reformation;" Mr. Monk, on "Geography;" Mr. Kirby, on "Great Painters;" Mr. Boorman, on "The Pitcairn Islanders;" Mr. Johnson, "A Reading from Shakespeare;" Mr. Monk, "A Reading on Lord Macaulay." For the coming season the course of lectures was as follows:—Mr. Barnett Blake, of Leeds, on "The Philosophy of the Breakfast Table;" Mr. Henry Vincent, on "Home Life, its duties and its pleasures;" Mrs. Balfour, on "Charlotte Bronte;" Mr. Wheeler, on "The Planets and their Attendants;" Mr. Gerald Massey, on "Robert Burns;" Mr. William Parsons, on "Old Homer and his days;" Dr. Letheby, on "Ancient and Modern Alchemy;" the Rev. E. Paxton Hood, on "Kings Crowned and Uncrowned;" Dr. Lankester, on "The Sea-shore, its products and its Lessons." A new feature in the Society's operations was the offer of prizes to stimulate a spirit of laudable emulation in the production of works of literature or art. The following prizes had been offered:—A guinea edition of "Keith Johnston's Atlas of General Geography," for the best, (and if the competitors number ten, a twelve and sixpenny edition of the same work for the second best) "Map of England and Wales;" also a guinea edition of "Longfellow's Poems," for the best (and, if the competitors number ten, a half-guinea edition of the same work for the second best) "Essay on Recreation." Up to the present time, ten mem-

bers have given their names as competitors in the construction of the maps. A special fund had been formed by shilling subscriptions for the purchase of the rewards. It had been arranged to hold the ordinary meetings monthly in the Public Rooms, and the time was to be occupied by the production of the report of the society's proceedings, discussion upon the affairs of the Institution, and readings and conversation upon the writings of great men, as Shakspeare, Longfellow, Lord Macaulay, and others. The financial statement showed that the receipts had amounted to £129 6s. 11¾d., the expenditure to £126 2s. 0¾d., leaving a balance in the hands of the Treasurer of £3 4s. 11d. After the adoption of the report, the election of officers took place. Mr. F. W. Monk was re-elected president.

Marylebone Literary Institute.—Sir F. H. Goldsmid, M.P., as President of this Institution, opened the lecture season of 1860 on Monday evening, the 15th Oct., with a lecture on "The Public Health, and the means of promoting it." The lecture was given in the theatre of the Institute, in which a very full audience had congregated to hear the hon. member. The lecturer opened his subject by remarking upon the difficulty of ascertaining, from any reliable data, the measures adopted in other countries and other times than our own, or their results. There could, however, he said, be no doubt that in all countries public health was largely influenced by food, drink, dress, cleanliness, pure air, and wholesome recreation. He attributed the prohibition of the use of certain animals as food by the law of Moses entirely to sanitary conditions, and observed that when modern custom differed from the Mosaic law in this respect, as in the case of swine, medical science proved that in warm climates especially the use of swine's flesh was injurious to health. The directions in Leviticus as to purifying and cleanliness were likewise based upon sanitary principles. Turning to the Romans, he called attention to the great care, as proved by the remains of their aqueducts and sewers, taken by them to provide their city with pure water and thorough drainage. He next spoke of the progress of sanitary improvements in our own country, and its effect in lessening the rates of mortality—drew a comparison of the healthiness of England with France and Prussia, showing that for want of due attention to sanitary principles in the most healthy of the Prussian cities, the proportion of deaths to the population was higher than in the most unhealthy towns in this country; dwelt upon the importance of making sanitary knowledge an element in our system of school education; and suggested that in girls' schools cooking and housework should be likewise taught. He spoke of the model lodging houses and the improved mode of building labourers' cottages, as calculated to promote health, and suggested that to check the evil consequences to the public health arising from the continued rush of the population from the rural districts to the great towns, it would be desirable to erect dwellings for the working classes a few miles out upon the lines of railway, which might be let at such a rent as would leave room for the payment of transit between the home and the place of work. After some practical suggestions and comments the hon. member wound up by urging the importance, in an economical point of view, of paying increased attention to the subject of sanitary reform. A vote of thanks to the lecturer was unanimously accorded, which the hon. member acknowledged by stating how gratified he was at having the opportunity of serving the Institution.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Geographical, 8½.
Medical, 8½. Clinical Discussion.
Tues. ...Syro-Egyptian, 7½.
Civil Engineers, 8. Renewed discussion "On Submarine Telegraph Cables."
Medical and Chirurg., 8½.
Zoological, 9.
Wed. ...Literary Fund, 3.
Society of Arts, 8. Prof. Leone Levi, "On Italian Commerce and Industries."
Graphic, 8.
Microscopical, 8.
Archæological Assoc., 8½.
Thurs...Roy. Soc. Club, 6.
Philological, 8.
Royal, 8½.
Antiquaries, 8½.
Fri.......Astronomical, 8.
Sat. ...Asiatic, 3.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, November* 30*th*, 1860.]

Dated 17*th October*, 1860.

2524. W. Ramsell, 218, Evelyn street, Deptford, Kent—Imp. in the manufacture of boiler plates, also applicable generally for the resistance of steam or internal pressure, and in the apparatus or machinery employed therein.

Dated 29*th October*, 1860.

2648. W. Clark, 53, Chancery-lane—Imp. in railway brake apparatus. (A com.)

Dated 1*st November*, 1860.

2670. M. A. J. Dahmen, Peckham—Protecting ships and other vessels, buildings, works of construction, and other bodies.

Dated 3*rd November*, 1860.

2691. J. H. M. V. Hinsbergh, Breda, Holland—Cleaning and preparing pig's wool, so as to give it the elasticity of horsehair and the flexibility of wool for bedding, etc.
2694. J. Armour, Perceton Fire Clay Works, Kilmarnock, N.B.—Imp. in dies employed in the manufacture of sewage pipes, chimney linings, and other hollow bodies of clay.
2696. W. White and J. Parlby, Great Marylebone-street, Middlesex—Imp. in colouring or obtaining the effect of colouring, and other ornamentations, to surfaces in relief, or partly in relief.

Dated 6*th November*, 1860.

2714. W. Green, NewBond-street—Imp. in fire-arms breech-loading.
2718. T. W. Rammell, 6, Victoria-street, Westminster—Imp. in centrifugal discs revolving in air, water, and other fluids, and in the application of motive power by such discs.
1730. G. Wilson, York—An improved construction of stoppered bottle.

Dated 8*th November*, 1860.

2746. J. Cutts, Liverpool—Imp. in apparatus for ascertaining or indicating the number of persons that may pass through or over any particular place, applicable to omnibuses and other vehicles, theatres, ferrys, gardens, baths, and other places.
2750. W. F. Henson, New Cavendish-street, Portland-place—Certain improved fabrics made entirely or partially of alpaca or mohair.

Dated 9*th November*, 1860.

2760. J. W. Wallis, Fenchurch-street—Imp. in book indexes.
2762. D. B. Lewis, Cheltenham—Imp. apparatus for propelling steam vessels.

Dated 10*th November*, 1860.

2764. W. C. Forster, Gibson-street, Lambeth—An improved method of manufacturing soluble silicate of potash.
2766. T. B. Daft, 2, Queen-square, Westminster, and W. Pole, 3, Story's-gate, Westminster—Imp. in the fish joints of railways.
2768. E. B. Wilson, Parliament-street, Westminster—Imp. in the manufacture of railway wheels, tyres, axles, and points and crossings, which improvements are also applicable to the manufacture of ordnance, tubes, and metal cylinders generally.

Dated 12*th November*, 1860.

2770. F. Walton, Haughton Dale, near Manchester—Imp. in insulating telegraphic conductors.

Dated 13*th November*, 1860.

2774. D. Thomson, Grosvenor-road, Pimlico—Certain imp. in rotatory pumps for raising water and other liquids.
2776. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Imps. in the motive mechanism of cabinet organs, and other cylinder musical instruments of that class.

2778. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Certain imps. in the construction of organ pipes. (A com.)
2780. A. V. Newton, 66, Chancery-lane—An improved construction of feathering paddle-wheel. (A com.)
2782. T. Hughes, Wolverhampton—An imp. in spittoons.

Dated 14th November, 1860.

2788. R. W. Waithman, Bentham, Yorkshire, and J. Waithman, Manchester—Imp. in the manufacture of cords, twines, and similar articles, and in the machinery or apparatus employed therein.
2790. F. E. Sharp, 3, Gloucester-terrace, Blackheath—An improved portable rifle battery. (A com.)
2792. J. S. Crosland, Johnson Brooke, near Hyde, Chester—Certain imp. in steam engines.
2794. R. H. Gratrix, Salford—Imp. in obtaining colouring matters for dyeing and printing. (Partly a com.)
2796. J. A. Bruce, Leamington, and G. H. Cottam, Old St. Pancras-road—Imp. in hay racks.

Dated 15th November, 1860.

2798. J. Schofield, Oldham, and M. Schofield, of the same place—Certain imp. in machinery or apparatus for doubling yarns of cotton or other fibrous materials.
2799. J. Matthews, Burton-upon-Trent, Staffordshire—Imp. in brewing.
2801. P. Unwin, J. Unwin, and J. U. Askham, 124, Rockingham-Sheffield—A saloon barrel pistol knife.
2803. G. Bagshaw, Preston—An improved arrangement of the flues of steam boilers for consuming smoke.
2804. W. H. Ralston, Keele, Staffordshire—Imp. in the manufacture of soda ash.
2805. G. R. B. Amott, Queen-street, Ross, Herefordshire—An improved plough, with mortise chisel, and plough iron combined.
2806. A. V. Newton, 66, Chancery-lane—Imp. in sewing machines. (A com.)
2807. R. B. Brooman, 166, Fleet-street—An imp. in the manufacture and in the welding of steel and wrought and cast iron. (A com.)
2808. R. A. Brooman, 166, Fleet-street—Imp. in sword bayonets and other swords. (A com.)
2809. J. Ridley, Stagshaw, Northumberland—An improved method of effecting the combustion of fuel, and of products arising therefrom.

Dated 16th November, 1860.

2811. C. Stevens, 15, Welbeck-street, Cavendish-square—Imp. in sheet-iron tiles. (A com.)
2813. C. W. Williams, Liverpool—Imp. in steam boilers for increasing the evaporative effect thereof, applicable also to stills and other like vessels or apparatus.
2815. J. Stockley, Newcastle-on-Tyne—Imp. in apparatus for grinding, smoothening, and polishing plate glass.
2817. E. B. Wilson, Parliament-street, Westminster—Imp. in the manufacture of railway wheels, and other articles of cast steel or malleable cast iron.
1821. R. A. Brooman, 166, Fleet-street—Imp. in joining or connecting together pipes and tubes. (A com.)
2822. W. H. Woodhouse, Parliament-street—An improved method of, and instrument for, measuring distances.
2823. W. L. Thomas, Southsea, and Colonel H. P. de Bathe, Scots Fusilier Guards—Imp. in the construction of plates or shields for the purpose of resisting shot and other projectiles.
2824. M. L. J. Lavater, Guildford-street, York-road, Lambeth—Imp. in portable or syphon filters.
2825. M. A. J. Dahmen, Park-road, New Peckham—Imp. in treating vegetable fibrous substances in the manufacture of paper.
2826. G. Glover, 8, Queen-square—Imp. in apparatus used in measuring gas.
2827. A. Morrison, Nottingham—Imp. in locks.

Dated 17th November, 1860.

2829. B. Blackburne, York-buildings, Adelphi, and H. Carr, Victoria-street, Westminster—Imp. in axle boxes.
2833. B. Barrett, St. Giles-road, Norwich—Imp. in the treatment of natural and artificial stone, and in the manufacture or production of artificial stone.

Dated 19th November, 1860.

2837. O. Vandenburgh, New York—Imp. in projectiles to be used in guns and ordnance, and improvements in the appliances for their projection.
2839. W. Butlin, Northampton—Imp. in machinery or apparatus for stamping and ramming, to be chiefly applied to and used for the purpose of paving.

Date 20th November, 1860.

2841. T. T. Macneil, Mount Pleasant, Dundalk—Improved means of obtaining adhesion on railways for ascending inclines, and other purposes.
2843. J. Hamilton, jun., Liverpool—Imp. in tubular wrought iron telegraph posts.
2845. A. V. Newton, 66, Chancery-lane—An imp. in the construction of spring hinges. (A com.)

Dated 21st November, 1860.

2847. J. Marland, Ivy Cottage, Hunslett, Leeds—Imp. in warping and sizeing yarn and thread.
2849. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the manufacture of boots and shoes, and of a new material to be employed therein, which material is applicable to various other useful purposes. (A com.)
2351. H. Dearden, Rochdale—Imp. in machinery or apparatus for punching washers, for giving the necessary drag or friction to the spindles and bobbins of spinning machinery and similar purposes, and also in the method of using or working the said washers.
2853. W. Cooke, Charing-cross—Imp. in ventilating.
2855. W. Cope, W. G. Ward, and E. Cope, New Basford, near Nottingham—Imp. in lace machinery.
2857. C. Myring, Walsall, Staffordshire—Imp. in the manufacture of covered harness furniture, buckles, slides, and other similar articles, and in the machinery or apparatus to be employed in such manufacture.

Invention with Complete Specification Filed.

Dated 22nd November, 1860

2858. S. A. Varley, 7, York-place, Kentish Town, and C. F. Varley 4, Fortess-terrace, Kentish Town—Imp. in the regulation of heat, parts of the invention being applicable to other purposes.

Patents Sealed.

[*From Gazette, December 4th*, 1860.]

December 4th.
1372. J. Mabson.
1373. C. Senior.
1378. A. J. P. de Carvalho.
1382. G. Hadfield.
1385. E. T. Hughes.
1386. F. H. Wenham.
1386. C. Hadfield and W. A. Attkins.
1392. P. Hooley and J. Wood.
1393. J. Saunders and J. Piper.
1396. T. W. Miller.
1397. P. Vangeneberg.
1402. E. J. Hughes.
1407. G. J. Cookson.
1408. G. A. Waller.
1412. A. A. Croll.
1413. G. Mackenzie.
1820. J. Westwood.
1423. C. Breese.
1428. V. de Tivoli.
1440. C. Loewenstein.
1444. G. Firmin and C. Firmin.
1459. G. Davis.
1461. J. West.
1474. H. Widnell.
2475. E. Stone.
1579. G. C. Morgan.
1580. G. C. Morgan.
1613. W. Skinner.
1822. E. Dugdale.
2013. J. Campbell.
2046. G. Kershaw.
2282. T. Greenwood.
2307. J. Campbell.
2318. E. B. B. Barker.
2322. J. H. Johnson.
2443. W. Hood.
2457. G. Bonelli.
2461. T. Barnett.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, November 30th*, 1860.]

November 27th.
2970. J. Nichols.

November 28th.
2975. R. A. Brooman.

[*From Gazette, December 4th*, 1860.]

November 29th.
2976. D. K. Clark.
November 30th.
2989. J. Eccles.
2994. J. Fowler, jun., and W. Worby.
2996. A. Parkes and H. Parkes
3000. J. Rubery.
3023. F. O. Ward.
December 21st.
2987. E. C. Shepard.
2997. J. Livesey.
3000. R. Hazard.
3001. E. Slack.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, November 30th*, 1860.]

November 20th.

2778. A. E. L. Bellford.

[*From Gazette, December 4th*, 1860.]

December 1st.

2800. J. Reilly.

Journal of the Society of Arts.

FRIDAY, DECEMBER 14, 1860.

INTERNATIONAL EXHIBITION OF 1862.

His Grace the Duke of Newcastle, Secretary of State for the Colonies, has transmitted to the Council of the Society a copy of a letter addressed to his Excellency the Governor of Jamaica by the Council of the Royal Society of Arts of that Colony, evidencing the desire of that Society that the Colony should be worthily represented in the approaching Exhibition. The following is an extract from this communication:

"The Council are feelingly alive to the good that will probably result to Jamaica from an abundant illustration of the resources of this Island in the said Exhibition, by an accumulation of specimens of the natural and artificial products of the country.

"The Council have determined to use every exertion in their power to render this department entirely and every way creditable to this Island; if the means are afforded them by the Island Legislature, they will allow nothing to interfere with their transmission to the said International Exhibition such an amount of Island products as shall win for the Colony similar honours to those achieved for her by the Society at the Great Paris Exhibition of 1855."

GUARANTEE FUND FOR THE EXHIBITION OF 1862.

The following additions have been made to the List of Guarantors and of the sums guaranteed since the announcement in the *Journal* for December 7 :—

*** *The names marked with an asterisk are those of Members of the Society of Arts.*

NAMES.	AMOUNT.	REPRESENTING THE OBJECTS OF THE SOCIETY—ARTS, MANUFACTURES, AND COMMERCE.
Amount announced last week	£367,900	
*The Earl Granville, K.G., 16, Bruton-street	1,500	Arts.
*Robert Rumney, Ardwick Chemical Works, Manchester	100	Commerce.
*John Murray, 7, Whitehall-place, S.W.	1,000	Arts.
Total	£370,500	

By Order, P. LE NEVE FOSTER, *Secretary.*

EXAMINATIONS, 1861. — NOTICE TO INSTITUTIONS AND LOCAL EDUCATIONAL BOARDS.

The attention of Secretaries of Institutions and Local Boards is specially called to Par. 5 of the Programme of Examinations for 1861, as follows :—

5. A detailed list of the chairman, secretary, and other members of each Local Board, giving not only their names but their addresses and designations, should be submitted to the Council of the Society of Arts before the 1st of January, 1861. In some cases the Local Educational Boards comprise such large districts that for the convenience of the Candidates, Branch Local Boards have to be formed within the Districts. Wherever this is the case, the names and addresses of the members, both of the District Board and of its Branch Boards, must be forwarded to the Secretary of the Society of Arts. All changes in the composition of the various Boards now in existence, or to be formed hereafter, should be immediately notified to the Society of Arts.

FOURTH ORDINARY MEETING.

WEDNESDAY, DECEMBER 12, 1860.

The fourth Ordinary Meeting of the One Hundred-and-Seventh Session was held on Wednesday, the 12th inst., Sir Thomas Phillips, F.G.S., Chairman of the Council, in the chair.

The following gentlemen were proposed for election as Members of the Society :—

Bacon, Jacob Perkins ...	69, Fleet-street, E.C.
Brown, Henry	Market-street, Bradford.
Cheere, Robert	31, York-terrace, Regent's-park, N.W.
Clifton, Edward Norton	47, Upper Harley-street, W.
Jeffery, Wm. J.	9, Regent-street, S.W.
Morley, Henry	4, Frederick-villas, East Brixton, S.
Pike, Ebenezer	Cork.
Roberts, Joseph	7, Old Jewry, E.C.
Whichcord, John	16, Walbrook, E.C.

The following candidates were balloted for and duly elected members of the Society :—

Chandos, the Marquis of...	Wotton, near Aylesbury.
Cornforth, John	Berkley-street Mills, Birmingham.
Fairbairn, Thomas	Northwood, Manchester.
Hunt, John	156, New Bond-street, W.
Millar, John, M.D.	Bethnall-house, Cambridge-heath, N.E.

Nicholls, G. P.	Aldine-chambers, Paternoster-row, E.C.
Roskell, Robert	156, New Bond-street, W.
Yolland, Col. W., R.E....	17, Westbourne-park, W.

The Chairman expressed regret at the absence of the Right Honourable W. E. Gladstone, M.P., who had kindly signified his willingness to preside that evening, if not prevented by absence from town.

The Paper read was—

ON ITALIAN COMMERCE and MANUFACTURES.

By Professor Leone Levi, Barrister-at-Law.

A new era has at last dawned on the political and economical condition of Italy. Suddenly and unexpectedly has she risen from a state of torpor and hopeless depression to a living, energetic, and dignified assertion of her title to be ranked among the leading nations in Europe. Most favourably placed by her geographical position in the very heart of the eastern hemisphere, rich in her productions, abounding in sea coasts, with excellent harbours in the Adriatic and Mediterranean, bordering on immense inland countries, and with a population, on the whole, intelligent and industrious, there is no valid reason why Italy should not occupy in the nineteenth century a position, at least as high, as in the thirteenth and sixteenth centuries.

The spirit of commercial enterprise which once prompted the Italian traders to undertake daring adventures in the East, must, it is true, find new fields of activity; the superior advantages of their position, and their exclusive command over rich and unexplored markets are, doubtless, for ever lost to them; the Europe of the nineteenth century is not the Europe of the middle ages. Other nations have risen. Communications by sea and by land are now open between the most distant countries. And the entire character of the world's commerce in the present day bears no analogy whatever to the state of mercantile relations at the period when the Italians were supreme in commerce, manufactures, and shipping. Still Italy may be a great commercial nation. She may develop her varied and abounding resources. The sea is as open to the Italian seaman as to the British or the American, and in the immensely widened field of commerce, in every corner of the earth, there is ample room for the display of energy, skill, and enterprise.

Important lessons may be derived from the early exploits of the Italian traders. How many industries have they introduced throughout Europe! How many of those institutions which form the life-spring of commerce came in reality from the shores of the Mediterranean or the Lagunes of the Adriatic! Yet, when we pronounce the name of Italy, our associations at once run to her monuments and arts. We think of Genoa, with her palaces and churches, sumptuous in their rich display of marbles, statues, and paintings; of Florence, with her galleries, fountains, porches, and pavements; of Rome, with her obelisks, arches, temples, and pyramids; of Venice, with her bridges, palaces, and arsenals. How little do we realise that these are the monuments of their former prosperity; that they are the fruits of ancient Italian commerce and industry.

In immediate connection with the East, the Italians were the first to draw westward those articles which Egypt and Syria have always contributed to European taste and luxury, such as spices, silks, precious stones, and pearls of considerable value. These articles, by the most indirect and circuitous route, from the interior of India to Goa, from Goa to Aden, by caravans and river navigation, were introduced into Italy, and thence by the Italians, spread throughout Europe. Their ships brought them as far as the Hanse towns, and their mercantile houses traded with them in the chief marts of merchandise, whence they drew wool and flax, and other raw materials, which they manufactured and sent to India and the East.

But what difficulties had the Italians to meet in the prosecution of such a trade! Look at the anarchy which prevailed throughout Europe; at the continuous hostilities and jealousies which existed among the different States and Republics, however near to each other. Think of the absence of roads, insecurity of inland communication, dangers of maritime commerce, want of credit, and want of capital; and think of the absence of all those elements which now give so much vitality and so much impulse to trade. Commerce was, indeed, adventurous. There was no marine insurance and no steam navigation in those days. The merchants were not backed by a formidable power ready to defend them against any exaction. Every inch of ground they gained, every adventure they realised, was, of itself, a triumph. That with such difficulties, and at so much peril, the Italian merchants should have been able to carry on so large a trade, is, indeed, wonderful; and we can only ascribe it to qualities personal to the people themselves, to an indomitable perseverance, and to well-directed energies.

Unfortunately, the Italian Republics partook far too much of the spirit of the times. Their enterprises were all begun and ended under the shield of brute force. Nor did they recognise any of those bonds of amity and common interest which should bind together sister communities. We have heard in recent times of keen competition and ill-repressed feelings of commercial rivalry, when each branch of trade sought to advance its own prosperity at the expense of all other branches, but what was such competition as compared with the hostilities between the Italian Republics? In their frantic eagerness for gain, and in their thirst of conquest and aggrandizement, they seemed to have forgotten all ties of a common nationality. And whilst they strove to injure each other, they procured their own destruction.

I will not enter into the political feuds of the Italian Republics, the cause, alas! of so much disunion, weakness, and suffering, for centuries and centuries. What we have to do is to observe the expansion of their commerce at a time when other nations in Europe were sunk in ignorance and barbarism. Amalfi is the most ancient of Italian republics. In the days of her prosperity she had a large population and a considerable shipping. She had direct relations with the Levant, and in the year 849 she even protected Rome from a threatened invasion. It was Flavio Gioja, of Amalfi, who brought into use the mariner's compass, and her laws of navigation, the "Tavola Amalfitana," were extensively adopted by the Mediterranean republics. But Amalfi excited the jealousy of Pisa, and she succumbed before a Pisan fleet. Pisa herself, however, after having taken a great part in the Crusades, and enjoying a considerable prosperity, became an early prey of Genoa. Florence succeeded Pisa; but she had not the advantage of a maritime position favourable to the foreign trade, and she gave herself to the development of her manufacturing industries. It was, in fact, the Florentine manufacture that constituted the chief bulk of Italian exports. Her silks and woollens were everywhere used. Banking operations were carried on at Florence with great success; and as early as the eleventh century the Florentines were the chief bankers of Europe, all public loans passing through their hands. In Italy alone there were more than eighty Florentine banking houses. Whilst the Peruzzi were lending money to the Knights of St. John of Jerusalem, the Bardi were farming the British customs. The noble families of Florence were all connected with commerce and industry. The Pazzi, Capponi, Buondelmonte, Corsini, and Falconeri were bankers, manufacturers and exporters. And whence had the great Medici

amassed their princely fortunes but by successful operations in wool and other manufactures?

Genoa was for a considerable time the most formidable rival of Venice. The Genoese ships were the first to pass the straits of Gibraltar, and in 1316 they came as far as London. Though the Venetian marine was more numerous and better constructed, the Genoese had abler and bolder sailors. But Genoa was miserably governed; the constitution was always changing; party quarrels were frequent, and her commercial policy was intolerant and narrow-minded. Had Genoa had as good statesmen as she had merchants and sailors, she would not have refused the offer of Columbus, and she might have mastered events which speedily caused her prostration.

And what shall we say of Venice? Of that most renowned and most ancient republic? As early as the year 450, Venice was founded by the inhabitants of Aquilea, who sought a refuge on the sea and on the lagunes of the Adriatic from the ferocious hordes of Attila. Driven by necessity, like the Dutch, to derive their subsistence from navigation and commerce, the Venetians devoted themselves to fisheries and the production of salt, but the security with which they carried on their trade amidst the devastation of all inland states, soon attracted both colonists and capital from distant lands, and very speedily the island became rich and populous. The progress of Venice was indeed magical. Scarcely had she emerged from a position of isolation and indigence than she entered into active relations with the Levant, obtained many privileges in the East, and acquired considerable territorial possessions. She was universally acknowledged as the mistress of the sea. Her ships were not only the most numerous, but the best constructed, and best manned and commanded, and in their engagements with the Arabs and pirates were uniformly successful. Small indeed was the Venetian fleet as compared with the British at the present day. Although at the best time of the republic the Venetian ships numbered not less than 3,000, their tonnage was small, three-fourths of them being from 10 to 100 tons. Her dockyards, as depicted by Dante in the following verses, were as active as those of Liverpool and London:—

> "As in the arsenal of Venice boils,
> Tenacious pitch in winter, to repair
> The bark disabled by long watery toils;
> For since to venture forth they are afraid,
> One here a vessel builds, another there
> Caulks that which many voyages hath made;
> One strikes the prow, one hammers at the poop,
> One mends a main and one a mizen sail;
> One shapes an oar, another twists a rope,
> So not by fire beneath, but art divine,
> Boiled up thick pitch throughout the gloomy vale."

Various manufactures settled in Venice. The silk manufacture was very important. The manufacture of arms, jewellery, wax, soap, perfumery, and glass, each acquired considerable reputation; and if any further proofs were wanting of her advance in the arts, industry, and commerce, we might find them in the extensive transactions carried on by the Bank of Venice. The operations of commerce must have been very extensive before the Venetians could have recognised the utility of such an establishment. Everything in Venice manifested activity and prosperity, and, as might be expected, luxury and pride grew apace.

Never was Venice more sure of her supremacy, and more confident in the progress of her trade, than towards the end of the fifteenth century. She never thought that the envy with which other nations regarded her growth would one day lead to discoveries fatal to the maintenance of her monopoly. The idea that the opening of a maritime route round Africa could take away their Indian commerce, never entered the minds of the Venetians, even when the route was actually discovered. What all the world saw, they could never believe, and when they began to feel the effect of the new revolution, instead of putting themselves in advance of other nations, they doggedly pursued the old and exploded track. Their eyes were not open till all was lost, when the treasures of India flowed northward, and when the discovery of America transformed entirely the relations between the different parts of the world.

But we must have done with the past, and deal with the present. Think not that the old spirit of the Italian trader is extinct. It is living, and it will live. It lives in Italy, and it lives in the Italians wherever they reside. International law tells us that a Scotchman living or trading in England is an Englishman; but, however much he may love and admire England, he will be but a poor specimen of a Scotchman if he does not resent with indignation the calumny that he has ever broken the ties which bind him to his Highland home. And so with the Italians, be they in England, France, Greece, or Turkey. So hereditary, indeed, is this spirit of nationality—nay, even national instincts and national aptitude—that after the lapse of generations it still remains undecaying and unchanged. As an example, take Scio, one of the islands ages ago mortgaged to the House of Giustiniani, of Genoa, by one of the Emperors of the Greek Roman Empire. That island is still for all practical purposes Genoese. All the traditions are Genoese; all the houses are built in the Genoese fashion; and, if I am correctly informed, by far the largest number of Greek merchants—at least so-called—in this very London and Manchester, are only the descendants of the Giustiniani, of Scio. A most curious and interesting coincidence, corroborated, I believe, from the fact that the Scio Greeks are uniformly marked by the elongated form of their heads, the effect of an old Genoese custom of putting children's heads in frames. Little, perhaps, do our shrewd Greek merchants think that they are now the living representatives of the Italian traders of the middle ages.

What is the present state of industry and commerce in Italy? As from the snowy tops of the Cenis or the St. Gothard, we gallop towards Italy, what first arrest our eyes are those impetuous waterfalls which descending into the beautiful lakes below, by numerous canals and navigable rivers spread themselves over the fertile plains of Lombardy. Nowhere has the hand of man seconded so ably the gifts of nature. Where can we find a system of irrigation more perfect than that which enriches the Milanese territory? The works of Leonardo da Vinci, Raffaelle, and Brabanti, are to this day the admiration of the world. Hence the advanced condition of agriculture in the great plains of Northern Italy. Whilst the land is in a manner forced to produce a constant succession of grass and grain, the vine and mulberry beautify the country, and give employment to the dense population. In Southern Italy the vine, the olive, and the mulberry, are the chief objects of culture; but the system of irrigation and drainage is not so perfect as in the north. Whilst some portions of land have but little water, other portions are often inundated with water, charged with an enormous quantity of vegetable matter carried from the mountains. As a whole, the agricultural riches of Italy are considerable, and her industry is well rewarded.

In mineral riches Italy is not so fortunate. The great want in Italy is fuel. Timber is dear, and the only substitute for coals is the deposits of anthracite, a mineral substance, consisting of carbon, with a minimum amount of hydrogen. Yet Tuscany abounds in copper, iron, mercury, lead, boracic acid, &c.* Tuscany is to Italy what Cornwall is to England and Hungary to Austria. At best, however, the productions of the mines are indeed small. But let us pass to other industries.

The production of Silk, and the different industries attached to it, are of great importance. Northern Italy alone produces silk to the amount of £7,000,000 to £8,000,000, and of a quality far superior to the produc-

* See papers by Mr. Jervis, in *Journal*, Vol. VIII., pp. 536, 567, 689, 699, 723, 743, 755.

tions of any other country. China and India are now sending to Europe immense quantities of silk, yet the Italian organzine and other filatures are as much required as ever. The Straw-work manufacture of Tuscany is of great value. Tuscany alone produces the raw material, and the value of straw hats exported is well nigh £1,000,000 per annum. The marbles of Carrara, the ornamental stones termed Mischio di Saravezzo, the alabaster and serpentine, are not only productions of immense value, but are the materials of industries strictly national. The manufacture of mosaics in Florence has a world-wide fame, and wherever we travel, and whether we inspect the palaces of sovereigns, or galleries of art, everywhere we find the productions of the Italian chisel, the glories of Italian art. But Italy is not only rich in works of art and articles of luxury; her fertile land and her rich pasture afford the most delicious and most nutritive articles of provisions. Much I might say of the Parmesan Cheese of Milan, Lodi, and Pavia, on the extensive production of excellent wine throughout Italy, as we well know, by the Nasco of Sardinia, the Aleatico of Tuscany, the Vino Santo, and Lacryma Cristi of Sicily; and also on the rice, grain, maccaroni, and fruits which find a market throughout Europe. Nowhere, perhaps, can we find more varied productions and industries than in Italy. But they want growth and expansion. They only indicate what they might become under more favourable auspices. Our acquaintance with Italian produce and industry is very imperfect; even the recent Universal Exhibition failed to display in a proper manner what Italy can furnish to the world. In 1851, the number of exhibitors from Tuscany, the Roman States, and Sardinia, was about 200, but Lombardy and Venice were concealed under the huge heading of Austria, and the Two Sicilies were not represented. At the Universal Exhibition of Paris, in 1855, the number of exhibitors from the Roman States, Tuscany, and Sardinia, was nearly 500, but the same deficiencies were experienced as regards Lombardy, Venice, and Naples. We shall soon see what Italy will exhibit in 1862. Assuming that the work of regeneration, and the reform of abuses, now vigorously in progress, must occupy the attention of the Italians for some time to come, it will be from 1862 that the economical progress of Italy will date. Let us hope that an effort may then be made to exhibit in a thorough manner the various resources of that gifted land, and that thenceforth our trade with Italy may double or treble the present amount. Our imports thence probably amount now to £3,000,000, not including, however, the Italian silk which arrives here through France; and our exports to Sardinia, the Italian-Austrian States, Tuscany, the Papal States, and Two Sicilies, exceed £6,000,000.

The present amount of commerce in Italy is doubtless immensely inferior to that of the United Kingdom, France, or the United States, yet if we take all the States together, the imports of Italy will amount to about £30,000,000, and the exports to £26,000,000, a tonnage entered and cleared of nearly 4,000,000 tons, with a mercantile marine of 700,000 tons. In the last decennium the commerce of Sardinia has more than doubled, but that of other States has shown but little improvement. No better evidence can be produced of the superior position of the northern States than the fact that whilst Sardinia exports at the rate of 32s. per head, the exports of Tuscany average 25s., those of the Roman States 11s., and those of the Neapolitan States barely 8s. per head. As yet the exports of Italy consist principally of her own produce, and of articles prepared for manufacturing purposes. In cotton, woollen, and linen manufactures, the modern wonders of mechanical power, Italy cannot think of competing with Great Britain, though she produces considerable quantities of such articles for her own consumption. There are, however, no positive hindrances to her achieving, even in these, considerable distinction. No climate is better adapted than the Italian for vividness and brilliancy of colour. Dyewoods they may have in abundance. The water is good, and as for power of inventiveness, we might well trust the land of Raffaelle Correggio, and Carracci.

But what has become of the great Italian Republics? Their institutions are gone for ever. They are the shadow of the past. Yet some of them still preserve considerable importance. Genoa is the chief outlet for the Mediterranean of the manufactures of Switzerland, Lombardy, and Piedmont; and Lombardy receives most of the foreign articles imported through Genoa. She has a population of 120,000, an excellent harbour, a commerce of importation and exportation amounting to £15,000,000, and a mercantile marine amounting to 200,000 tons. She has large manufactures of silk, cotton, wool, hides and leather, and considerable foundries and establishments of mechanical engineering. There is life in Genoa, and she will be the first to benefit from the extension of the territories in Northern Italy. Leghorn is by no means unimportant. She has a population of 100,000, and an export and import trade of about £7,000,000 to £8,000,000. Naples, also in the Mediterranean, is a large seaport, the principal port, in fact, of the two Sicilies, with much trade and extensive manufacture. Civita Vecchia is of no great importance. In the Adriatic Ancona is essentially a mercantile city, with a large marine; but Venice, still prostrate under the galling yoke of Austria, has but little left of her former glory. When will she rise as a man to shake off the chains of her slavery? Do we not smart with indignation on beholding that fairest of all cities, that ancient mart of merchandise, that Queen of the Sea, made the victim of the most unheard-of oppression and tyranny? Would that at any price she could speedily be wrested from the claws of Austria. What is to be the price of her redemption? Let a sum be named. She will readily pay it. Italy will pay it, and exultingly she will cry "At a great price I have purchased this freedom." At Rome, too, the metropolis of the world, the city of the Cæsars, foreign bayonets are still parading the streets. What for? To prop up a faded government and a sovereign infinitely more sick and decrepid than the Sultan of Turkey. Oh, it is high time that an end should be put to such political crimes, that the inviolability of states and the rights of nations should be better respected. It is high time for the nations of Europe to exact from their rulers a more frank and explicit policy. Alas! alas! how often the most iniquitous acts are accomplished under the mask of the most insinuating intentions. But we have nearly forgotten our topic—the present condition of Italian trade. Yet how can we disconnect politics and commerce? The political subjection of Italy has been the main cause of her decadence.

For years, and I may say for centuries, has Italy been misgoverned and oppressed. Despotic Sovereigns have kept her under thraldom. Foreigners have trodden her under foot. Her best citizens and her wisest statesmen, guilty of no crime, but an ardent love for their own dear fatherland, have been torn from their homes, immured in dungeons, and left to waste their shattered lives roaming in foreign lands. Discontent and revolution, insecurity of life and property, were the necessary consequences, and with them industry was discouraged, commerce diminished, and capital and credit speedily disappeared.

The sub-division of Italy into so many little States, each bound by a customs-barrier, and each pursuing a different policy, so restricted internal commerce, and crippled the markets for home consumption, that no encouragement whatever was afforded to the extension of industrial establishments. Who would think of planting a factory of any extent in States so circumscribed? Hence inventors obtained no remuneration for their discoveries, and the best novelties found their way to other States of Europe.

Another great evil is the deficient state of communication. In the centre of Italy goods are still carried from town to town by horses, mules, and donkeys. Many lines of railway have been opened in the north, but more are wanted, to form a perfect link between Sicily and Turin,

and to afford a free and easy communication between the Adriatic and the Mediterranean. National shipping has hitherto had no encouragement. The science of navigation is well cultivated; and the timber for ship-building is excellent, but the petty governments had no sufficient influence with foreign powers to demand a due respect for their flags. Poor Venice has always been sacrificed to advance the interests of Trieste; and Ancona, ruled by ecclesiastical "Monsignors," has always been made the tool of Austrian intrigues.

We cannot complain much of the commercial policy of Italy. The principles of free trade were early advocated by Italian economists, and it was in Italy that the true maxims regarding money and wealth were first advanced, and though, owing to her limited trade, the Italians had no opportunities of developing and working out the principles they so ably investigated, the tariffs have always been, as a whole, rather favourable to the development of national resources. In thus briefly noticing the causes which have hindered the progress of Italian commerce, it is impossible to ignore the baneful influence exercised by the religious practices of the country. Those interminable feast-days and holidays, those constant processions and pilgrimages, in my opinion, rob the people of their most precious time, and engender in them habits of idleness not easily broken off. Think of the numerous legal and binding feast days; think of the saints' days which each district keeps sacred to its patron; think of the Carnival, that time of buffoonery, libertinage, and revelries; think of Lent, that season of physical exhaustion caused by fasting, and think of the poor Jews, who are doomed to keep all their own feasts and those of the Roman Catholics as well. There is no need of an Early Closing Association in circumstances such as these. But shall I not say a word of the Inquisition, that fearful tribunal, that scourge of nations? The time is happily gone by for exhibitions of *auto da fe* and burning piles, but are not the inquisitors of Rome, Ancona, and all places and states wherever they have the slightest freedom of action, ever ready to impose disabilities on Jews, Protestants, Greeks and any other sect? What is it that has raised England to her present pitch of prosperity but the freedom she has granted to strangers of all climes, and the respect she has paid to the creeds of all nations?

A glorious mission is now afforded to the illustrious sovereign who from the Alps to Sicily is saluted as King of Italy, and great indeed will be his moral triumph should he succeed in lifting up that nation to a position worthy of her ancient rank. It is a gigantic task, but it must be accomplished. Recent events have given the most irrefragable proof that Italy is more than a geographical designation, that she is one kingdom, one in language, and one in political aspirations. To establish throughout the length and breadth of that land wise laws and institutions, is the first duty of the newly-elected sovereign, and bold measures are absolutely required for the purpose. Doubtless, grave difficulties will beset his path at every turn, and time must necessarily elapse before the different measures may bear ripened fruits. Let him not be discouraged. Reforms are wanted on every side:—religious, moral, social, economical, and political reforms.

A permanency of political institutions, perfect security for the investment of capital, freedom of locomotion, impartial and prompt administration of justice, a satisfactory state of finance, perfect tolerance of all religious opinions, and, above all, the most complete civil liberty, including the liberty of the press; these are objects of the highest importance to achieve, but though they are doubtless replete with difficulties, there is a power of public opinion, a *prestige* connected with the regeneration of a nation once so great and chivalrous that will render all these reforms a work of comparatively easy execution.

The world owes much to Italy. To her we owe those classical poets and historians, and those masters of oratory which have ever been, and will ever be, the models and standards of all seminaries. To Italy we owe a system of jurisprudence the influence of which is still felt in the law and procedure of all civilised States. To her we owe the first treatise on algebra and the first great work on anatomy. It is there that Galileo, that great luminary of physical and natural science, rose to dissipate the darkness that surrounded the world; and there it is that painting, sculpture, and poetry have reached the highest perfection.

Need I remind you of Columbus and Cabot, of Dante and Petrarch, of Raffaelle and Michael Angelo, of Donizetti and Paganini, of Rubini and Grisi; and need I say a word to engage your sympathies in favour of Cavour and Garibaldi, those heroes of the mind, the heart, and the hand, who, under God, have disenthralled my own dear fatherland from the bonds of oppression and slavery?

A country which has given birth to so many masters of Science and Art—a country which possesses so many claims to the gratitude of the learned and the good—a country, in resources so rich, and in position so commanding—is well entitled to a high place in the Councils of Europe, and the civilised world will not be tardy in awarding to her the tribute which is due to the oldest and most successful explorer of European Commerce and Industry.

APPENDIX

Economical Condition of Italy in 1856.

	Population.	Imports.	Exports.	Revenue.	Expenditure.	Debt.	Shipping.
		£	£	£	£	£	Tons.
Sardinia (continent)	4,368,972	15,852,711	12,523,164	5,438,692	5,749,074	27,224,000	177,000
,, (island)	547,112	587,815	460,070				
Tuscany	1,796,078	3,006,564	2,323,236	1,265,591	1,297,029	4,662,442	31,000
Roman States	3,124,668	3,253,734	1,676,386	3,039,321	3,135,436	2,500,000	30,000
Two Sicilies	9,117,005	3,210,819	1,468,709	5,000,000	5,000,000	2,000,000	220,000
Lombardy	3,009,505	2,156,392	6,205,753				
Venice	2,493,968	1,958,266	647,500	...	...	...	30,000
Tyrol	925,066?	700,000?	300,000?				
Modena	600,676	250,000	53,800	300,000	300,000	...	
Parma	508,784	190,000	150,000	370,000	370,000	...	
	26,491,834	30,166,301	25,808,618	...	...	36,386,442	488,000

NAVIGATION OF ITALIAN PORTS.—TONNAGE OF SHIPPING ENTERED AND CLEARED.

	GENOA.	CAGLIARI.	VENICE.	LEGHORN.	ANCONA.	NAPLES.	CONTINENTAL PARTS OF TWO SICILIES.	PALERMO.	MESSINA.	TOTAL.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
British	136,895	27,366	52,257	114,724	57,072	99,250	87,373	114,690	100,115	789,742
Neapolitan and Sicilian	104,568	7,734	21,692	23,000	3,117	198,896	...	333,566	303,803	996,376
Sardinian	336,954	104,066	5,313	8,000	390	28,526	67,839	2,512	8,174	561,774
French	141,673	17,003	3,414	2,300	...	33,396	205,648	1,720	197,460	602,614
Austrian	16,833	3,976	146,352	11,000	101,384	1,462	128,813	5,044	8,087	422,951
Roman	6,343	1,657	3,198	4,000	48,497	...	46,209	662	252	110,818
Tuscan	98,056	2,426	1,092	160,000	...	4,938	17,391	...	...	283,903
United States of America	43,615	16,516	15,526	8,000	837	3,218	7,960	42,666	31,010	169,348
Swedish and Norwegian	42,694	25,248	...	10,026	246	2,928	4,475	3,068	6,935	96,620
Greek	4,648	9,150	31,651	7.800	517	1,830	2,942	...	7,888	66,426
Dutch	14,239	1,660	7,875	3,600	794	3,178	8,969	3,482	4,631	48,428
Spanish	15,297	6,082	...	1,500	...	1,372	3,048	...	...	27,299
Modenese	5,905	...	...	15,000	...	...	438	...	...	21,343
Danish	4,110	..	1,798	1,800	240	248	1,471	1,046	9,178	19,891
Turkish	...	482	3,101	400	...	...	7,018	...	...	11,001
Ionian Islands	...	2,382	...	...	...	52	7,994	...	...	10,428
Russian	...	...	...	1,000	...	...	5,941	1,000	2,269	10,210
Belgian	6,588	...	116	200	...	...	...	370	568	7,842
Oldenburgh	364	...	506	6,000	...	...	...	...	...	6,870
Prussian	957	2,562	750	100	...	...	1,924	...	506	6,799
Bremen	4,366	...	...	...	...	...	...	...	...	4,366
Hanoverian	1,264	...	770	80	...	...	...	758	1,619	4,491
Mecklenburgh	3,977	..	...	...	...	...	...	...	...	3,977
Hamburg and Hanseatic Towns	1,882	...	208	350	...	260	...	...	...	2,700
Tunisian	236	28	...	...	...	...	2,299	...	...	2,563
Peruvian	2,344	...	...	...	...	...	...	...	...	2,344
Jerusalem	560	260	...	1,300	...	...	...	...	...	2,120
Portuguese	1,392	...	...	100	...	...	...	...	...	1,492
Uruguay	834	...	542	...	...	...	...	...	...	1,376
Moldavian	418	...	682	...	...	...	...	...	...	1,100
Argentine Republic	692	...	...	...	...	...	...	...	...	692
Chilian	854	...	...	...	...	...	..	...	...	854
Servian	...	...	254	...	...	...	...	...	...	254
Total	998,558	228,598	297,097	380,280	213,094	379,554	607,752	510,584	682,495	4,299,012

ARTICLES OF ITALIAN EXPORT IN 1856.

Brandy	4,000,000	galls.
Wine	8,000,000	,,
Olive Oil	23,000,000	lbs.
White Lead	1,200,000	,,
Bark of Pine (tanned)	2,700,000	,,
Fruit (green)	28,000,000	,,
Oranges and Lemons	1,200,000	boxes
Seed, Oleaginous	2,200,000	lbs.
Hides, wet and dry	2,300,000	,,
Cotton, raw	12,000,000	,,
Wool	80,000,000	,,
Silk, waste	1,000,000	,,
,, prepared for throwing	15,000	,,
,, raw	8,000,000	,,
,, thrown	2,000,000	,,
,, manufactured glacé	90,000	,,
,, thread	250,000	,,
Rice	50,000,000	,,
Maccaroni	4,000,000	,,
Paper	3,000,000	,,
Hardware	100,000	,,
Coral, wrought	45,000	,,
Machinery	22,000,000	,,
Lead Ore	15,000,000	,,
Hemp	25,000,000	,,
Stone and materials for building	50,000,000	,,
Cordage of hemp	1,500,000	,,
Skins and furs	700,000	
Works of modern art, sculpture, painting, &c	500,000	
Works of alabaster	400,000	
Rags of all kinds	4,500,000	,,
Chestnuts	40,000	,,
Raw Copper	400,000	,,
Borax	3,000,000	,,
Bark	10,000,000	,,
Soap	300,000	,,
Straw hats	500,000	,,
,, manufactures of	10,000	,,
,, plaited for hats	400,000	,,
Almonds	1,000	cwts.
Argols	12,000	,,
Fruits—dry figs	24,000	,,
Liquorice	10,000	,,
Nuts, &c.	8,000	,,
Sulphur	8,000	,,
Shumac	700,000	,,
Cream of tartar	26,000	,,
Linseed	10,000	,,
Brimstone	2,500,000	,,
Manna	2,800	,,
Fish, salted	6,000	,,
Barilla	184,000	,,
Cheese	800,000,000	,,
Timber for building		
Grain		
Animals, &c.		

TRADE OF THE UNITED KINGDOM WITH ITALY IN 1858.

	IMPORTS FROM	EXPORTS TO
	£	£
Sardinia	148,937*	1,361,140
Italian-Austrian Territories.	669,558†	1,516,481†
Tuscany	538,500	1,086,670
Papal States	96,656	420,666
Two Sicilies	1,656,523	1,787,300
	3,110,174	6,172,257

* Considerable quantities of silks are imported from the Sardinian territories, Lombardy and Venice, through France.

† The trade with the Austrian territories include the trade with Austria proper, through Trieste, but the larger portion was for Venice and Lombardy.

DISCUSSION.

Mr. WINKWORTH said the learned Professor's paper contained information which would be valuable at any time, but which was peculiarly so at the present moment, when, as Mr. Levi most emphatically said, a new era was bursting on the history of that interesting country, of whose natural and industrial resources he had so ably treated. Hitherto its producing capabilities had been "cribbed, cabined, and confined." Commercial freedom,

the cultivation of mechanical science, and the healthy growth of manufacturing skill, were not consistent with a state of political slavery. These could only flourish where property and person were secure, which had not been the case since the Middle Ages. Of this the International Exhibitions of 1851 and 1855 afforded melancholy evidence. Raw materials, such as silk and others mentioned in the paper, were shown indeed in sufficient abundance, but of manufactured goods the samples were "few and far between." And from one extensive district, the Neapolitan, no specimens graced the walls or the counters of 1851, and they were but scantily supplied in 1855. The late King of the Two Sicilies absolutely ignored the Exhibition of 1851, and would not allow his subjects to send to it any of their native productions. And yet what ample scope was there in all Italy, and especially in Naples, for the exercise of manufacturing talent, and what a charity it would be to employ the idle population of that devoted city—the ignorant, bigoted, famished, and therefore dangerous lazzaroni, in the development of those rich native resources to which the Professor had drawn attention. Might he not now pretty confidently indulge the hope that, in addition to political liberty and personal security, the example of France in the direction of commercial freedom, would inaugurate a millennium of social, moral, and material prosperity in Italy, and contribute to remove the fetters which had been so long riveted on the minds and bodies of Italians? Already a Treaty of Commerce was said to be in progress of negotiation between France and Belgium, and it was thought probable that the commercial policy of the Zollverein would be still further liberalised. Taking all these facts into consideration, therefore, he could not but confidently anticipate that, 'ere many years had elapsed, all civilised nations would have returned, as far as their artificial financial conditions would permit, to the normal and wise provisions of Providence for the mutual interchange of their superfluous productions, without the ruinous exactions of oppressive duties. Towards this "consummation so devoutly to be wished," this country had had the honour of taking the initiative. In 1824, when all prohibitory duties were abolished; in 1841, when the corn laws were repealed; in 1846, when a large mass of commodities were allowed to come in free, and all protective duties were abrogated; and finally, during the present year, when, under the powerful auspices and enlightened views of the present Chancellor of the Exchequer, who was, unfortunately, prevented from occupying the chair that evening, the last rag—no, not quite, for "rags" still remained to be dealt with, but the last vestige of fiscal obstruction, had been scattered to the winds.

Mr. E. W. Trent remarked that there was one article of commerce which had been lightly touched upon, but in which he was personally interested—namely, Italian hemp. He might say it was the finest, strongest, and most durable hemp in the world. Such was the difficulty of manufacturing it, when it was first introduced into this country some 25 years ago, that the workmen employed upon it, and paid by the piece, could not earn remunerative wages; but at length the value of the material was clearly manifested, and it had been extensively used ever since. Some years ago he introduced cordage made of this material to the Barking fisheries; but as it was of a very white colour, they thought it was East Indian Sunn fibre, and objected to use it. He had it tanned, however, and it was then extensively used, and its value was fully recognised even to the giving a much higher price than was paid for Russian hemp. Such was the demand for it that, if his firm had continued the manufacture, they might have employed a 40-horse power engine upon that work alone. During the Crimean war our Government was searching in all directions for hempen materials, and at that time his firm manufactured some rope from flax grown in Ireland, by Mr. Roach, now Lord Fermoy, who took great pains with its cultivation and preparation, obtaining one ton of flax from four tons of straw, the ordinary quantity being six or seven tons of straw to one ton of fibre. Mr. Trent then proceeded to read an analysis of the relative strength of cordage made from various descriptions of hemp. The testing at Chatham dockyard in January, 1855, gave the strength of nearly one-fourth in favour of Italian over Russian hemp. In calling attention to the various specimens of fibres upon the table, Mr. Trent remarked that the sample of New Zealand flax was of the description for the more perfect cleansing of which the Colonial Government had offered premiums to the amount of £4,000. With regard to the Italian hemp, he believed if it were introduced into India it would flourish well, and with machinery which he would suggest for dressing it, he had no doubt it might be most beneficially and profitably cultivated in that country, and would prove as advantageous to India as the introduction of an improved breed of sheep had been to Australia. They were quite aware of the fact, so remarkably evidenced by the able paper of Dr. Forbes Watson, read before the Society last Session, that India was a fibre-growing country, but in his opinion the indigenous fibres of India were no more to be compared with Italian hemp than the crab-apple could be compared with the best cultivated fruit. The Bombay hemp was worth from £18 to £20 a ton, but the principal duty of the inspector of cordage of the late East Indian Company was to see that no East Indian fibre was introduced into it. He had made the inquiry why the Italian hemp was not used, but he was told that the system had been so long established, that any changes would meet with opposition in many quarters.

Mr. Hilton begged permission to ask one or two questions upon this paper. He would inquire in the first place, whether the information he had received was correct—that the Tuscan government had assimilated their coinage and currency to that of Sardinia. If that were so he thought it was a step in the right direction, tending to get rid of some of the difficulties which had stood in the way of international communication. In the next place he would inquire whether Mr. Leone Levi could inform them the reason of the present short supply of sulphur from Sicily. Just now it was a very scarce article, and he should be glad to hear whether this arose from political causes or from labour in that country having been directed from its ordinary channels. The usual price of good rough brimstone, called in the trade "good seconds," was £4 10s. per ton; it was now worth £10 5s per ton. This was the material from which sulphuric acid was made, a chemical very largely used in our manufactures, and the price of that article had been enhanced in consequence of the increased cost of the sulphur. He believed Scotland was the largest consumer of the sulphur of Sicily, whilst England supplied almost all Europe with rough chemicals; and he thought some advantages would be derived from the recent treaty with France, with respect to the chemicals going into that country. The article of Italian produce in which he was principally interested, was olive oil, which had, of late, risen very considerably in value. That was also owing, he believed, to labour being diverted from its usual channels. In fact, there was a considerable rise in the prices of many of the staple commodities of Italian production; and if these could be reduced he was confident the Italian trade would be very greatly augmented.

Mr. P. L. Simmonds said, he had listened with much interest to the very instructive paper of Professor Levi, in which he had spoken with such eloquence on the past, and such hopefulness on the future of Italy. The subject of the commerce and industries of that country was brought before the Society most opportunely at this time of transition, when, after a stormy period of political disturbance, Italy, it was to be hoped, would subside into a combined State, destined to make moral and material progress, and to take prominent rank by its commerce and agriculture among other European nations. To accomplish this, however, much yet remained to be done, and

the incubus of a serious debt and a large standing army would press heavily for some time upon its resources, and it would also take time to return to the peaceful pursuits of industry after the excitement of war. That there were the elements of prosperity existent in the country Professor Levi had pointed out, in fertile soil, favourable climates, and convenient shipping ports. But the list of products enumerated by Professor Levi, and the rather small number of samples placed on the tables, conveyed but an imperfect indication of the raw and manufactured products obtainable in that country. However warm our sympathies with Italian freedom and liberty might be, they would in time cool down, and we should come to the more selfish and business view of the subject, resolving itself into— "what does Italy produce that is useful to us, and what will she take of us in return?" Prominent mention had been made by two previous speakers of three important Italian products, viz., hemp, sulphur, and olive oil. With respect to the fine quality of hemp, it was to be regretted that our supplies of this valuable fibre should have dropped from 35,000 cwt. or 40,000 cwt. to none at all. As for introducing it into this country, great as the demand for flax and hemp was, the acreage here under culture was receding rather than expanding, it being considered an exhausting crop, and there being difficulties thrown in the way of its culture by landowners; while it was also found that the land was more valuable here for pasture, or for wool or cereal crops. If it was meant to acclimatize it in India, attention had, he believed, already been given to its introduction into the Punjaub. Olive oil ought certainly to be produced more largely in the Italian States, the land of the olive, for at present the limit of supply was two thousand to three thousand tuns. Perhaps, however, some of the other animal and vegetable oils, of which such large quantities were now imported, might have interfered with its application and consumption. As regarded brimstone or sulphur, we now received about one million or one million and a half cwts. from the Two Sicilies, and about 10,000 cwt. from the Papal States. The importance of a due supply of this valuable substance for various chemical manufactures was known to every one. The demand for sulphuric acid was enormous, and continually increasing. On boracic acid, which was imported to the value of £80,000 or £100,000, the Society had recently had some valuable information laid before it. So also as respected marbles, the bulk of our supplies, to the value of about £65,000 a year, came from Italy. Argol and cream of tartar, the concretion of the wine casks, came in to the extent of 15,000 cwt. Essential oils and essences were other products for which the climate of Italy was peculiarly favourable, and which were always in demand. At present the value of those obtained from Italy was £40,000 or £50,000. Then there was a large quantity of liquorice juice and paste, 32,000 cwt. a principal use of which was said to be to flavour London porter. Even the maccaroni and vermicelli, of which samples were on the table, were not unimportant products, our imports making 5,000 or 6,000 cwts. a-year, worth about £12,500, although this had been much interfered with by the cheaper and inferior French and German imitations, made chiefly of potato starch. Of madder, we at present received about £107,000 worth from Italy. This was a most important dye stuff to the calico printers of Manchester and Glasgow, and for it we paid to France about one million sterling a year. Sumach was another important dye and tanning substance from Italy, the value of the imports of it from thence being £121,000. Rags were another raw material which was in great request by our paper-makers, particularly as the linen rags were fitted for the superior class of papers. A few years ago we obtained about 2,000 tons a year from Sardinia, but now only 500 tons, and as much from the Roman States, for the Americans and others competed with us in this market. Tallow and wool could also be obtained in small quantities. But there were two great industries in which we were specially interested, the exact condition of which in Italy was desirable to be known. These were silk and cotton. Having recently been preparing new editions of two well-known works, "Ure's Cotton Manufactures," and "Ure's Philosophy of Manufactures," he had had to make himself acquainted with the present condition of the great textile industries on the Continent, and he might be permitted to read an extract from the proof sheets, which related to the Italian States:—

"Sardinia is a large producer of silk, and the crop a year or two ago was estimated at 57,000,000 lbs. of cocoons. The greater proportion of the silk is exported in a raw state. In 1856, there was imported into the kingdom of Sardinia 795,310 kilos. (of $2\frac{1}{5}$ lbs. each) of raw, waste, and thrown silk, and 49,437 kilos of plain manufactured silk. The value of the direct exports of silk to Great Britain have lately ranged in value from 1,500,000 to 2,000,000 francs.

Turin, Nice, Coni, Alessandria, and other towns produce silk, both raw and organzine, in abundance. The cultnre of silk indeed forms the staple of industry of those places. The habits and wants of the insect are so well known, that with care it may be successfully raised in these northern provinces. The silks raised in Piedmont are very fine. They are bright and lustrous, and the twist is strong. The number of extensive producers is considerable, amongst whom may be specially named Messrs. Pelissini and Mancardia, of Turin; Mosca, Brothers, of Chiavazza; Dinegri, of Novi; Novelli and Bonelli, of Savillani; all of them owners of large establishments for reeling and for rearing the worms. Everything shows that the silk business is carried on to great perfection in the Sardinian states."

The trade in silk, in 1858, in the Sardinian States, was as follows, in kilogrammes of $2\frac{1}{5}$ lb.:—

	Imports.	Exports.
Raw Silk	700,679	331,694
Thrown Silk	371,597	915,896
Tissue of Silk	105,902	32,891

The value of silk and articles manufactured from it, exported from Tuscany, amounted to about £5,500,000 annually. The Piedmontese organzines, taken in the aggregate, were, probably, now superior to any in existence; although those made by a few French firms realised higher prices. But it remained to be seen whether they would be able to keep pace with the numerous contrivances by which French and English engineers were constantly diminishing the cost and improving the quality of this delicate fabric. The large increase in the exports of thrown silk, might, to some extent, be due to a simultaneous increase in the home growth of the raw material; but there could be no question that the production of organzines had far outstripped the growth of native silk. In fact, many of the mills in Piedmont were working up for re-exportation Chinese and Bengal silk, purchased in London. There was no means of ascertaining the present quantity of silk stuff manufactured in Piedmont. In 1844 there were 4,600 looms, and 10,500 operatives, and the silk consumed was 290,000lbs. Little or no progress had been made since that period, as the manufacturers complained that it was in vain for them to struggle against the French figured silks in foreign markets. The mere cost of the pattern became a heavy item, when distributed over the very limited number of pieces they disposed; whereas the French manufacturers had so large a home market, that the cost of their patterns was comparatively light. Passing on to cotton, he might now state that Sardinia imported on an average four or five million pounds of cotton from England and France, and about the same quantity from the United States; but in 1855 her direct importation from North America reached nearly 15,000,000lbs. There seemed no sufficient reason why American vessels should not convey the whole quantity required by Sardinia directly to Genoa, and English or French vessels might carry thither a portion of American cargoes landed at Liverpool or Havre. A similar remark was applicable to the other ports of Italy, and those of Austria on the Adriatic; and the enterprise of establishing lines of ocean steamers between ports of the United

States and those of the Mediterranean would, if successful, tend greatly to encourage, if not secure, such direct importation, There were three cotton yarn manufactories in the Venetian provinces in 1856; one at Torre, one at Verona, and one at Pordenone, and 33 in Lombardy. A manufactory of cotton goods, containing 250 looms, was attached in the early part of 1857 to the spinning establishment at Pordenone, the productions of which tended to lessen the consumption of British goods. In Lombardy, 18,000 looms were employed in the manufacture of cotton, of which 16,000 were in the province of Milan. The spinneries and manufactories were increasing in importance. The official value of the imports of British cotton manufactures into Sardinia, which in 1852 were above one million sterling, had declined more than a fifth in the last five years, owing to the progress of native manufactures. The cotton industry had more than quadrupled since the year 1844. All the recent improvements of machinery adopted in England and elsewhere were to be found in the Piedmontese factories. They not only spun sufficient yarn for the home market, but were exporting considerable quantities to the Duchies. At the end of 1856 there were in Sardinia 35 cotton factories, with 228,000 spindles. Calculating the mean product of these in No. 16 yarn at 7 packets of 10 lb. each per spindle, the aggregate product would be about 18,000,000 lb. of yarn, one-half of which would be made into common fabrics on the spot, and the remainder sold to the trade. Even within the last year or two many of the mills had been enlarged, and English or French machinery of the most improved kind introduced in the place of the old Swiss machinery.

Mr. HILTON begged to add, with reference to the substitution of other descriptions of oils for olive oil, that he had never known a time when the latter was more in demand than it was at present, and the supply was a matter deserving of the closest attention. In 1850 or 1851 he imported olive oil from Messina and Gallipoli at £49 per tun; he had recently imported it at £61 per tun. In the same year he bought the finest Florence oil at £52 per tun, and had recently paid £70 per tun for the same description of oil delivered on board at Leghorn. The difference in price was greater than had ever before occurred within the recollection of the oldest member of the trade.

Mr. J. SURR had been much interested in listening to Mr. Leone Levi's able paper. Allusion had been made to the present race of Greek merchants, as being descended from the former inhabitants of Scio; and he was reminded of the ordinary proverb amongst those who had transactions with the Greeks—that "if it takes five Englishmen to make a Jew, it takes nine Jews to make a Greek;" for in their transactions with Greeks they rerequired to be so much upon their guard that unless they showed more than ordinary acuteness, they were likely to be losers. It struck him that one of the great reasons why Italy had not hitherto prospered commercially to a greater extent than she had done, was in a large degree the jealousy which subsisted between the various states of that country. To give an illustration of this, it was almost as if the various large counties of England—Yorkshire, Lancashire and Middlesex, instead of working together as one harmonious whole, were all mutually opposed to each other. With regard to the increased price of sulphur, he believed two principal causes might be assigned. One was that America largely imported that article, and another was that since the general failure of the grape crop, sulphur had been used in the vineyards all over Italy, and consequently they had a less quantity of that article to export. There was one product in which he was more particularly interested—that was silk. Although their importations of silk from Italy had been very large, yet they could now with the greatest ease do with ten times the quantity. Some years since, the silk crop failed, and it had never recovered. At the present time it was only two-thirds of what it was fourteen or fifteen years ago. England was now the great emporium of silk. The supplies from China and India had increased in an astonishing ratio, and the demand in this country had so much advanced that but for those supplies the silk trade would be almost in a state of stagnation. He hoped, under the state of things which had recently been established, they would have larger supplies of Italian silk, for they could take for the richer silks, satins, and velvets, ten times the quantity they were now receiving, and it would be mutually advantageous to both countries to do so.

Mr. SAMUEL BROWN, having recently returned from a hasty tour in Naples and Sicily, would mention what appeared to him to be the opinion of the people themselves as to the best means of increasing the commerce of the country. The great cry was the want of communication. The need of railways had been felt for many years. The inhabitants of Sicily were dissatisfied with the late Government for not increasing trade by those means which had promoted it so rapidly and effectually in this and in other countries of Europe; and he believed the first step to be taken by the new Government was to encourage the construction of railways and the establishment of ready modes of communication between the large towns. The island of Sicily had not a single railway; and, in the kingdom of Naples there were only two lines, of 20 or 25 miles each, throughout the whole of the country. This had created so great dissatisfaction, that, if the present government took up the question, it would be the most important advantage for the interests of trade, and the development of the country, that could be desired.

Mr. WENTWORTH L. SCOTT would be glad to be informed whether such adulteration of olive oil as he believed had been detected usually took place in the country from which it was imported or whether the probability was that it was done in England. He had seen various samples of the finer wines, which were declared not to have been opened since they left their native shores, but which had not proved to be genuine.

Mr. J. P. GASSIOT, V.P.R.S., said it was impossible to have listened to this paper without feelings of deep sympathy and interest. The most cursory readers of history must recollect that Italy had held the highest rank as a commercial nation at a time when this country was in a state of semi-barbarism. What had been the cause of her decadence in the scale of nations? They could not but reflect that this was in a great measure owing to the obstructions to commerce which had been so forcibly alluded to that evening. They could not but wish every success to Italy; but, at the same time, they must all feel that she had to undergo a severe ordeal. Only within the last three or four weeks a gentleman well acquainted with that country had said to him, "What we want is a strong government, one which will protect property and which will secure the development of the great resources which Italy has within herself." They might now venture to hope for that; and he thought it was reasonable to anticipate that the enlightened policy of Cavour, backed by such a man as Garibaldi, would tend to the regeneration of Italy. But still there were those local jealousies which had been alluded to, to be smoothed down and got rid of; and they might hope to see that done. He was himself interested as a merchant in wines, and thought they might look to Italy for an increased supply at a future date. Allusion had been made to the diminished supply of sulphur, and the enhanced price of that commodity in this country. It was to be borne in mind that every wine-growing country had drawn upon the resources of the two Sicilies for that commodity, and therefore they must expect an increase in the price. The rise might, however, be temporary, because the trade of Sicily was not developed. He felt obliged to the Society of Arts and to Professor Levi personally, for bringing this subject so prominently before them.

The CHAIRMAN, in closing the discussion, said—to an educated man the condition of Italy must always be a subject of deep interest—remembering her early and

long-continued civilisation, that during that period her history had been mingled with some of the most remarkable events in the history of the world, it was impossible they could have other than a feeling of deep interest in the future of Italy. The marvellous romance of the present year was in itself calculated to enlist their deepest sympathies in the condition of that country. Her people had ever stood foremost in the cultivation of every Art and Science. To her modern Europe owed much of its jurisprudence—to her they owed the most brilliant examples of Literature, Art, and Architecture; and to her, probably, many of the most valuable lessons in Agriculture were due. In fact, whatever she had set her hand to, she had adorned. He would echo—if it were of any use to do so—the sanguine expectations of the future of Italy which they had heard that evening, but it was impossible to shut their eyes to the fact that much of her commercial greatness during the brilliant period which had been alluded to was due to her geographical position between the East and the West. She became what Tyre and Alexandria were in ancient days—a principal link in the communication between India and Europe, and this seemed at all times to have been a source of great wealth. To that circumstance Amalfi first and Pisa afterwards owed distinction, and then Genoa followed in their wake, and became distinguished for commerce and wealth. Whatever might be the future of that county, however, it was difficult to conceive that she could ever again become, as she was before, the great link to connect the eastern with the western world. Italy produced, in remarkable excellence, raw silk, and also agricultural produce of great value; she had fine fruits; she had a population which in other times was characterised by industry and by other elements that conduced to wealth, and there was no reason why that population should not give to Italy the advantages she ought to possess, though it was clear that there would always be a great dissimilarity between the future condition Italy might attain and the circumstances of her past history. One or two speakers had alluded to the jealousies of the Italian States as explaining the modern decadence of that country. Now it was to be recollected that during the most brilliant periods of her history, the same jealousies, the same rivalry, the same deadly hostility prevailed. Therefore, he did not think that was the true explanation of the condition they deplored, and which they would be glad to see changed. He felt it was not well to moderate the aspirations of an ardent and brilliant people, but it was well to place the various conflicting elements before them, for it was only by the consideration of those conflicting elements that they could arrive at a true estimate of the future of Italy. It was impossible to regard that country without being struck with the extent to which it had contributed to our present high state of civilisation. Take the mariner's compass, for example. Let them for one instant ponder upon the extent to which that discovery had contributed to the position of modern commerce. Let them look at the fact of the three great men—Columbus, Americus Vespusius, and Sebastian Cabot, the discoverers of the new world, having been all of Italian origin. They might not all endorse the expressions with regard to Italian politics and religion, to which the learned professor had given utterance, because upon those subjects there would always be difference of opinion, but he was quite sure they would sympathise with the ardent aspirations which he had expressed for the future of his native country. Sir Thomas Phillips concluded by moving a vote of thanks to Professor Levi, for his paper.

The vote of thanks was then passed.

PROFESSOR LEVI said he was obliged to the meeting for the kind attention they had paid to his paper. In reply to some of the questions, which yet remained unanswered, he would state that as to the assimilation of the coinage, he believed one of the first measures taken in Tuscany, and concurrently extended to other parts as the annexation proceeded, was the adoption of a uniform system of weights, measures, and coins. The inquiries with regard to sulphur had been sufficiently answered. Then, with respect to adulteration, he might mention that the gentlemen who had favoured him with many of the samples exhibited (Messrs. Fortnum and Mason), had directed his attention to specimens of real Naples maccaroni; but they had stated that, for one box of that article, they would see a hundred boxes of French maccaroni. Both looked alike; but when they were boiled, the French maccaroni broke in pieces, whilst the Neapolitan article remained entire. The same remark would, no doubt, apply to other articles. As regarded hemp, there could be no question that the Italian was the finest in the world, and the same might be said of silk. There were samples of Italian organzine which produced 40s. per lb., whilst the great mass of India and China silk which came into this country might be purchased at from 15s. to 20s. per lb. This showed that the best qualities were produced in Italy.

The paper was illustrated by a collection of Italian wines and liqueurs, oil, and articles of food, contributed by Messrs. Fortnum and Mason; specimens of beads by Mr. Levin, of Bevis Marks; a series of the food-grains of Italy, by Messrs. Pietroni and Draper; specimens of Italian Silk, by Messrs. Durant and Co.; samples of Italian and other Hemp, by Mr. E. W. Trent; and other products; to all these gentlemen the thanks of the Society are due.

The Secretary announced that on Wednesday evening next, the 19th inst., a paper, by Mr. A. J. Tansley, "On the Straw-plait Trade," would be read. On this evening, Mr. John Dillon, Vice-President of the Society, will preside.

HERTFORD LOCAL BOARD.—DISTRIBUTION OF PRIZES.

On Tuesday evening, November 13th, a public meeting was held at the Town Hall, for the purpose of presenting to the Hertford candidates at the last examinations of the Society of Arts, the certificates which had been awarded them. The meeting was also convened for the purpose of bringing the object of these examinations prominently under the notice of the public, with a view to encourage more extensive local competition.

The Earl Cowper presided, supported by the Right Hon. W. F. Cowper, M.P., the Rev. J. W. Blakesley, Mr. Harry Chester, Sir Minto Farquhar, Bart., M.P., and Mr. G. J. Bosanquet. Amongst the audience, which also included many ladies, were the Mayor (Mr. Gripper), the ex-Mayor (Mr. H. Gilbertson), the Hon. and Rev. Godolphin Hastings, &c. The room was crowded to excess. On Earl Cowper taking the chair,

The Secretary to the Local Board (Mr. Marchant, jun.,) read the report, which states that the Local Board have at the end of this, their first year, but little to report, beyond the fact that as far as their operations have extended they have been successful, and have led to the hope that, when the system of examinations becomes better known, young persons will very generally avail themselves of the advantages held out to them by the Society of Arts.

EARL COWPER said:—The numerous attendance upon this occasion showed how deep an interest the town of Hertford took in that great question of education which had brought them together; and, indeed, there was no subject which could be more interesting to those who were anxious for the welfare and prosperity of the country. By education he did not mean the mere accumulation of knowledge—the cramming into a

man of as much information as he could hold, but he meant that kind of training which made the mind powerful and able, as the body nourished by proper food and developed by healthful exercise was made vigorous and strong. If education were considered as a means by which the mind was strengthened, and men made accurate and profound thinkers, they must admit that there was nothing which tended more to make the nation prosperous. No amount of money earned by the commerce or generated by the labour of the country—no triumphs of our arms abroad, however we exulted in them, as we did this day in the news of recent successes in China,—nothing indeed that could add to the power and increase the resources of a country, was of so much importance to it as that its inhabitants should think rightly and well. The object of the Society of Arts appeared to be to aid in the instruction of the poorer members of the middle class, and of the working classes of the country. Other classes were allowed to enter the lists, and to become candidates for the certificates which the Society granted, but it was to assist in the education of these two classes that the Society principally directed its efforts. It was most essential at this time that the working people should be taught to think rightly, and to form sound and well weighed opinions upon public matters, for, as a class, they were daily increasing in importance and making their importance felt, —able to dictate, or, at all events, to have a voice in the choice of what their labour should be, and how it should be conducted. And though the subject of political reform —so lately before Parliament and the country—was never mentioned now, they could not help feeling that the time was coming when the middle classes who, in 1832, gained that great victory which gave them so large a measure of political power, would have to share that power with those below them. It was, therefore, of the utmost importance that those who came to share with them political privileges and power should be in a condition to do so with advantage to themselves and the country; and this could not be unless their stock of knowledge was increased, and their mental powers invigorated and developed. The working classes must train and educate themselves. Too much patronage would be likely rather to do harm; for it was in their experience that the mechanics' institutions which succeeded best were generally those which had been taken up by working men themselves; while those established by others for the benefit of the working class ended in not being attended, or in falling into the hands of persons of a superior class, for whom they were not originally designed. Then came the question of testing the knowledge obtained by the working man, to ascertain if it was of any worth, and also as a means of affording a stimulus to further acquisition. This purpose was fulfilled by the examinations of the Society of Arts. He would not lay any stress on the advantage these examination offered to employers by giving them a ready means of judging whom they should employ, though in this respect they were useful, since a certificate of the Society of Arts was, in itself, a guarantee that its possessor was, to a certain extent, an educated man; but he was speaking of the advantages to the men themselves. There were some men who had such a thirst for knowledge that they studied for the sake of study, and found their pleasure and their reward in the pursuit itself. But he did not think this was a common thing in this country. In England we found more frequently that men so associated their aim with their labour, that whatever they did they did with an object. It was to give an object to these people, and thus induce them to acquire some portion of learning, that these examinations were useful. When certificates were obtained, no doubt object after object would rise up before their possessors. They would look upon them not as upon the prize for which they were struggling, but as a qualification to contend for the prize. Whatever the prize which those to whom he had now the pleasure of presenting the certificates of the Society of Arts set before themselves—and no doubt they had some greater object in view than that they had now obtained—he congratulated them on their success. His lordship then presented the certificates to the successful candidates, with these words:—I have great pleasure in presenting to you these certificates. Whatever may be your future course in life, the information you have acquired, and the reputation you have gained, will be of advantage to you; and I shall always feel happy in remembering that I had here an opportunity of meeting you, and of presenting to you these documents which certify your intelligence, industry, and success.

Mr. Harry Chester, on rising to move the first resolution, said that though not a stranger in Hertford, he felt he must be almost so to those whom he was addressing, and that, therefore, it was necessary he should tell them that he was there at the request of the Local Board, in order that he might explain to them as clearly and briefly as possible the general objects of the Society of Arts in its examinations, and the constitution of its Local Boards. He dared say that many of them had been present at schools of different kinds where prizes were given away broadcast; and it might have passed through their minds whether those prizes were given by persons absolutely impartial, and were a fair test of the attainments of those who received them. When the University of Oxford commenced its middle-class examinations, a large number of those who presented themselves for examination were plucked; and, he dared say, if inquiry could be made, it would be found that those plucked persons had previously carried home prizes from the schools where they had been taught. There was, however, no shadow of a doubt as to the value of the certificate given to those candidates who had come before that meeting; for it was given by a body of competent examiners in London, who were wholly ignorant of their persons and their names, and knew nothing of them except by their work, which was identified as theirs by a number on their examination papers. They might, therefore, be perfectly certain that if those young men were put to any test, however severe, it would only prove that the distinction they had obtained was honourably earned, and that they had a good and competent knowledge of the subjects on which they had been examined. What they had now to consider was what was the best means of promoting the education of the people; and it must strike every one that the best thing they could do was to apply the same principle in dealing with every class. Now, what was wanting in the system of education provided for the great mass of the industrial classes, was that principle which had long been applied to the higher classes—the principle of examination. It could hardly be conceived how much the education of the higher classes owed to the fact that the Universities had, during the whole time of their existence, been holding out before the great public schools of the country, a standard of reading and a test for the results of reading. It occurred to the Society of Arts that it might do something to supply this want in the education of the industrial classes; and the first thing it did was to establish a union with the various literary and mechanics' institutions throughout the kingdom; and, when this union had been carried on for two years, they took a step further, and proposed to establish a system of examinations. Mr. Chester then gave an account of the establishment and progress of the Society's system of examinations, explained the principles on which they were conducted, and pointed out the desirability of establishing a local Union of Institutions in that locality, as had been successfully done in Lancashire and elsewhere. He concluded by proposing:—

"That the scheme of examinations carried out by the Society of Arts in conjunction with the Local Boards deserves the attention of the Educational Institutions in this neighbourhood."

Sir Minto Farquhar, M.P., seconded the resolution. After speaking generally of the advantages of education, he pointed out the important influence exercised upon schools by periodical inspection or examination. It was the same in other matters, of which he would give an

illustration from what he had seen that day. He had seen that splendid corps of volunteers—the 1st Herts, under the command of their noble Chairman, inspected by Colonel Ibbetson. Who could doubt that that corps had been stimulated to exert themselves in their drill by a strong desire to distinguish themselves before the Inspector? And what had been the result? The Inspector had said he never saw a volunteer corps go through their duty in a more admirable manner. It was just so with regard to mental application. School inspectors stimulated the teachers and the scholars; and the examinations instituted by the Society of Arts were invaluable, because they stimulated the youths of the country to perseverance in a course of self-education.

The Right Hon W. Cowper, M.P., said his hon. friend and colleague had reminded them that that morning they had a review of the Rifle Volunteers, and that a great tribute of admiration was given by Colonel Ibbetson, who inspected them. He could not but think it significant that in the evening of the same day there should be another parade of a different sort—of volunteers in an intellectual campaign, still under the presidency of the same noble lord who had drawn his sword in the morning, and with great energy given the word of command, and in the evening, without a sword, had, with an eloquent tongue, led them through the requisite evolutions, and that they should also have received high commendation from their inspecting-officer, Mr. Harry Chester, who, after spending his life in the official conduct of State Education, had of late years devoted himself to be a sort of inspector-general of mechanics' institutions and other literary societies in connection with the Society of Arts, and had rendered most useful service to the country. This town was thankful to him for the steps he had taken in forming the Local Board, and in stimulating the cause of education here. It was satisfactory at this, the first meeting after the formation of the Board, to find that they had so far succeeded that, although only two candidates went from this Board to the Central Examination, both were successful. They had both obtained first-class certificates, and one of them had, to a great extent, gained the knowledge for which he had obtained that honourable distinction at the evening class held at the Cowper School. Those who were interested in education had for some time past felt that the great need in England was an improvement of middle-class schools. For the last fifty years great attention had been given to the improvement of primary schools; but until very lately it was felt that the middle-class schools were entirely wanting in all that was necessary to bring out their complete efficiency. But now a machinery was set on foot which was calculated to make them as efficient as they were capable of becoming. The Society of Arts' examinations seemed to be exactly the thing which those schools needed, for they furnished a means of encouragement, which was required in order to bring out the energies of both masters and pupils. Their great value consisted in this—that they supplied an inducement to young persons to study after they had left school; and this was absolutely necessary, for in this busy country it would not do to trust to the scholastic education given in schools. It was a very difficult thing for ordinary persons to educate themselves. There were instances of persons with great genius and untiring energy thoroughly educating themselves in spite of all difficulties; but ordinary persons required that facilities should be given them to cultivate their minds and acquire knowledge. And it was very gratifying to think that in this town there were such facilities. Among these was the Local Board of Examination, in connection with the Society of Arts, which afforded great encouragement to the young men of the town to pursue their studies with a view to prepare themselves for the great national examination conducted by the Society of Arts. And it should not be forgotten that the same examinations were also available to the fairer but equally clever sex. He hoped next year that his noble relative in the chair would have not merely to give certificates to gentleman candidates, but that he would have the more graceful and agreeable task of giving certificates to lady candidates. He understood that next year the Society of Arts intended to invite competition for a certificate which would be specially applicable to the fair sex—a certificate in domestic economy. And although some men might compete for it, he did not think they were likely to be successful competitors. The present Local Board of Examination was in its commencement, but he quite agreed with the suggestion thrown out by Mr. Chester, that they should endeavour to enlarge their sphere by affiliating themselves with other towns and other institutions. In Lancashire and Yorkshire this was done on a large scale, and the other day, when he was in the Town-hall of Leeds, on an occasion similar to this—when the Prime Minister of England distributed certificates to those who had passed the Society of Arts' examinations—it was a grand sight, in that great focus of industry and wealth, to see so many persons interested in this matter; and he could not but feel that before long such machinery must produce great and lasting results. It had been truly said that it was not requisite now to say much generally about education. We had happily reached the time when it was not required to advance arguments to prove the necessity of education. The certificates which had been presented that evening were better than any arguments which the most eloquent orator could address to them, to show the value of education. When an employer wanted a young man of steady and accurate habits, with a certain amount of intelligence and concentration of mind—one who would not fritter away his time, but employ himself steadily and usefully—he did not exactly know how to discover the person he wanted. If he received and acted on testimonials, he would probably find that he had been misled by the good-nature or hasty judgment of some one interested in the young man. But suppose such an employer to meet with a young man who could produce one of the Society's certificates, he would say, "Here is the young man who has the qualities I desire. This certificate is a satisfactory proof that he has been spending his leisure hours in careful study; it shows he is not one of those who care more about amusements than the intellect, and he is evidently the sort of young man I want." These certificates, therefore, were not merely a credit to the young men who had gained them—not merely an ornamental possession—but they had in the market a value. They were in themselves, then, a great argument in favour of the usefulness of education. But he did not want to advocate the great help which such education as was now given to night schools, and at colleges for the people, would give to a young man who wanted to get on in life, because it was very obvious that any training of the mental faculties must assist a man in the business of life; but he would rather refer to the great advantage which a young man or a young woman must derive from acquiring a habit of spending his evenings in intellectual pursuits. He was quite sure that no one who competed for these prizes and certificates would be sorry for having done so, for those who failed to get those distinctions, as well as those who succeeded, would have gained something, inasmuch as they would have acquired the habit of reading and studying with a definite object. He hoped their young friends the successful candidates, Crouch and Hills, would be encouraged by their success to persevere and endeavour to obtain a prize on another occasion, and he should be rather disappointed if they did not succeed in doing so. At all events they had now been put forward as the champions of Hertford in intellectual competition, and the wishes of their friends should encourage them to persevere. He begged to move:—

"That the success attained by the candidates who have just received certificates is calculated to encourage the youths and young women of this and neighbouring towns to follow the commendable example which has been set them."

Mr. G. J. Bosanquet, seconded the resolution.

The Rev. J. W. Blakesley, in proposing a vote of

thanks to Mr. Chester and the other gentlemen who had addressed the meeting, said he could not refrain from expressing his satisfaction that though the number of candidates who had come up from this town to pass the Society of Arts' Examination was but small, yet their efficiency was such that they had obtained first-class certificates. If any persons present were inclined to think lightly of certificates for such attainments as reading fluently, writing correctly, and proficiency in arithmetic, he would ask them to consider how much mental effort was involved in the acquisition of such acquirements. They were the elementary branches of education, and must be acquired before any other branch could be pursued; but they were so common that we were induced to look upon them with a degree of estimation far inferior to that which they deserved. But he believed, if they went closely into the matter, that it would be found that a greater amount of mental effort was necessary for the purpose of obtaining thorough proficiency in arithmetic than was afterwards necessary for the purpose of becoming an adept in the differential calculus. And the importance of these elementary branches of education could not be over-estimated. He would take an illustration from military matters. On one occasion a great military general, observing that the manner in which a number of raw recruits were performing their preliminary evolutions caused some derision, remarked, "You may be surprised that so much pains are taken about this, but let me tell you it is the goose-step that conquers kingdoms." So it was with reference to education. With regard to the resolution he had to move, he said their thanks were particularly due to Mr. Chester, for no person could have explained to them, so fully and correctly as he had done, the advantages of the scheme of Examinations instituted by the Society of Arts.

The Hon. and Rev. G. HASTINGS seconded the resolution, which was agreed to unanimously.

A vote of thanks to the noble Chairman, proposed by Mr. J. J. GRIPPER (the Mayor), and seconded by Mr. H. GILBERTSON (the ex-Mayor), was carried unanimously; and a subscription having been entered into for the purpose of liquidating the debt due to the treasurer, the proceedings terminated.

DISC WHEEL.

On Tuesday, the 11th inst., an experiment of a novel mode of propulsion in steam navigation was made in a trip from Blackwall to Erith. The paddle-wheel and screw have hitherto been the means employed for utilising steam power in navigation, but Mr. James Jones Aston, of the Middle Temple, has, it appears, taken out a patent for propelling steam-ships by a very different contrivance. *A priori*, the arrangement invented by Mr. Aston is the very last that would suggest itself to an observer, and the inventor himself candidly admits that both practical men and men of science ridiculed his idea when first propounded. The steam-tug *Saucy Jack*—by no means a favourable boat for the success of the experiment—was propelled down the river at a rate of six knots an hour by the agency of a disc wheel, and with a far less expenditure of coal than if either paddles or screw had been used. The earliest objection to the locomotive was that it would not "bite" the rail, but the experiment soon proved the objection to be worthless. It is still more difficult to conceive what hold a thin metal or wooden plate, not striking the water horizontally or obliquely, but cutting into it edgewise, like a knife, can have of the water. The diameter of the disc used in the experiment was 14 feet, with about two feet in the water. The thickness of the plate was only three-eighths of an inch, and it is asserted that the thinner the plate the greater the power. The engines of the tug were 30-inch, with a stroke of 42. The greatest number of revolutions made was 47. In the trip down the river the pressure in the boilers was 6lbs., and coming up 4lbs., the speed attained being about six knots. With the paddles the tug used to make about eight knots, but the expenditure of fuel was about 40 per cent. in favour of the disc. The conditions under which the trial was made were unfavourable to the experiment. She was not so readily started or so speedily stopped as the ordinary steamboats, but, perhaps, these disadvantages may disappear under more favourable circumstances. The disc may be constructed of metal or wood, or of both in combination, and several discs may be used on the same shaft, at convenient distances apart. There were five plates on each side in this experiment. The advantages of the disc, as enumerated by the inventor, are the following:—

1. It is less likely to be disabled in a storm or battle, and is therefore a safer propellor.
2. There are no paddles or blades to agitate the water, and the boat is free from vibration.
3. All the action of the propeller is in the direction in which the boat travels, and the motive power being more perfectly utilised, a much greater rate of speed may be attained than has hitherto been deemed practicable.
4. Its action is perpetual, and not intermittent.
5. There is no backwater, or loss of power on that account.
6. It is much less affected by wind and tide.
7. It is the only propeller well suited for canals and shallow rivers.
8. It may be used for small boats and other craft.
9. It may be worked with lower power, and at great saving of fuel.
10. It is of more simple construction, less costly, less liable to injury, and causes less wear and tear of the boat.

There were present to witness the experiment:—Capt. Lovell, of the Peninsular and Oriental Company; Mr. Wright, Assistant-engineer-in-chief to the Admiralty; Mr. Adams, Mr. Macrory, and Mr. Aston himself, the inventor and patentee.

ARSENIC IN PAPER-HANGINGS.

BY H. LETHEBY, M.B., M.A., &c., PROFESSOR OF CHEMISTRY AND TOXICOLOGY IN THE MEDICAL COLLEGE OF THE LONDON HOSPITAL, AND OFFICER OF HEALTH OF THE CITY OF LONDON.

About three years ago public attention was directed to a circumstance, well known to men of science, that a large proportion of the arsenic sold in this country was used in the manufacture of a green pigment for paper-hangings. This fact was mentioned, on the authority of Dr. Taylor in the *Times* newspaper of the 6th of January, 1858, and it forthwith excited a very warm discussion. On the one hand, manufacturers declared that as arsenical pigments were not in themselves volatile, and were, moreover, fixed to the paper by adhesive materials, they could not evaporate so as to infect the atmosphere of rooms, and be a source of danger. In support of this statement there was the testimony of chemists, founded on actual experiment, namely, that arsenic could not be volatilized from paper at any ordinary temperature, and that it could not be detected in the atmosphere of rooms covered with arsenical papers.* But on the other hand, there were the observations and experience of medical men, not merely in respect of the poisonous action of mineral green on those who are engaged in its manufacture, but also of the effects of the pigment on those who are occupied in handling green paper,† and who are exposed to its influence in rooms covered with it.‡ All of which

* Dugald Campbell, *Phar. Journ.*, vol. xvii., p. 520. Abel, *Ibid*, p. 556, and Phillips, *Ibid*, vol. xviii. p. 25, and *J. Soc. Arts*, vol. vi., p. 606.

† Taylor, *Phar. Journ.*, vol. xvii., p. 556, and *J. Soc. Arts*, vol. vi., p. 665. Hind, *Phar. Journ.*, vol. xviii. p. 224. Binchardat, *Annuaire de Therap.*, 1846, p. 209.

‡ Hind, *Lancet*, 1857, vol. i., p. 193, and *Med. Times and Gaz.*, May, 1857, p. 521. Halley, *Times*, Jan. 11, 1858, and *Phar. Journ.*, vol. xvii., p. 428. *Ibid*, vol xix., 482. *Lancet*, Jan. 6, 1860, and *Med. Cir.*, Jan., 1860, p. 37. Lorinser, *L'Union Medicale*, No. 118 (Oct. 4, 1860), p. 26. Hassall, *Lancet*, Dec. 1, 1860, p. 535. Metcalfe, *Ibid*, p. 535.

went to show that something is evolved from the pigment capable of producing the same class of effects as those which result from the operation of arsenic—namely, headache, dryness of the throat and tongue, nausea, irritation of the alimentary canal, great bodily depression, and various nervous disorders. Further investigation led to the discovery of arsenic in the dust of rooms covered with such paper,* thus proving that, although the arsenical pigment was not volatile in a chemical sense, yet it became detached from the surface of the paper and was easily diffused through the atmosphere of the room. Still, as no actual or undoubted case of poisoning had been clearly traced to it, it was well enough argued that all the effects attributed to arsenical paper might have arisen from other causes. At last, however, the mischief has been followed to its source. A fatal case of poisoning by such paper has been the subject of medical investigation. The case is described by Dr. Metcalfe, in the *Lancet* of December 1, 1860, p. 535, and as the chemical part of the investigation has been in my hands, I here offer a brief outline of it.

Clarence W. King, the son of Mr. W. T. King, of Beresford-lodge, Highbury, a child aged three and a half years, was taken unwell during the morning of Thursday, Nov. 1. He refused his breakfast, complained of chilliness, and was sick. At ten o'clock in the morning he was attacked with convulsions, and at 11 he was seen by Dr. Metcalfe, who found him in a semi-comatose state. His bowels were much relaxed, and were acting involuntarily. On visiting him again in the evening, Dr. Metcalfe was told that there had been convulsive twitchings of the face, and that he had been very feverish. On the following day, at seven in the morning, Dr. Metcalfe was hastily summoned to see another child, a sister, aged two and a half, who had been violently convulsed, accompanied with loud shrieks and severe dysenteric discharge from the bowels. At that time, the little boy had become much worse; he was almost in a state of asphyxia; the surface of the body was cold, the pulse feeble, and the countenance livid. By the use of appropriate remedies he was somewhat relieved, but in the afternoon of the same day he was seized with violent tetanic convulsions; and from that time there were alternations of repose and convulsive action, until the little sufferer died. This occurred thirty-eight hours after the commencement of the attack. At first, Dr. Metcalfe did not suspect the real cause of the mischief, but when the second child was attacked, it occurred to him that the effects in both cases were due to the same cause, and were not the results of natural disease. His suspicions were further aroused by the circumstance that three months previously the children had been attacked in a similar manner, and had recovered after leaving the house for the sea-side. On inquiry, he was told that they had, within the last few days, been playing with toys that were kept in the cupboard of a room lined with green paper; and that a day or two previously they had been amused by helping to clear out the cupboard, and that the little boy had been observed to suck a piece of lace which was found there. A large portion of the paper was at once removed, and sent to me for examination. I found that it was an arsenical paper, containing nearly fifty-two grains of arsenite of copper on a square foot, and the pigment was so loosely attached to the paper that it was removed by the slightest friction. The dust from about five square inches of the paper was capable of producing all the symptoms observed in the boy, and the pigment from a piece six inches square would have sufficed for the death of two adult persons.

On the following day the child's body was examined, and the organs were found free from natural disease. The stomach and part of the liver were sent to me for analysis, and the results were the discovery of arsenic and copper in both these organs. So clear was the entire history of the case—as the previous attack—the symptoms of arsenical poisoning—the simultaneous effects in both children—the discovery of the poison in the dead body—and the existence of arsenic and copper in such profusion on the paper of the cupboard—that the coroner's jury had no hesitation in returning a verdict that death had been caused by arsenic derived from the paper, and they added that the manufacturer had been guilty of very careless and culpable conduct.

In the course of the last year or two I have had referred to me many cases of suspected poisoning by green paper, and on examining the paper have invariably noticed that in such cases the arsenical pigment is but loosely attached to the paper, and no doubt the effects have been produced by the mechanical removal of the pigment and the diffusion of it through the atmosphere of the room. It is very probable that this effect is due in a great degree to the heat and the acid product of burning gas; for it has been frequently noticed that the poisonous action of the pigment is most clearly manifested in rooms lighted with gas. This may arise from the sulphurous acid, formed during the combustion of the gas, fixing itself within the porous texture of the paper, and becoming sulphuric acid, which soon destroys the adhesive matter that holds the pigment to the surface of the paper, and then the colour is easily brushed off.

All green papers are not equally poisonous, for as the shades of tint are produced by mixing carbonate of lime or chalk with the arsenical green, the proportion of arsenic may vary from a mere trace to many grains on a square inch of paper. The largest quantity which I have ever found has been in the proportion of fifty-nine grains on a square foot. A piece of this paper three inches and a-half square, has enough arsenic upon it to destroy human life. As far as my investigations have gone, the flock never contains arsenic, but is dyed with comparatively inert materials. It is the ground of the paper which is so dangerous: and here I may mention that any green paper which gives a deep-blue solution when it is steeped in liquid ammonia is suspicious, for it then contains copper, and in all probability arsenic likewise.

* Taylor, *Pharmaceutical Journal*, vol. xviii., p. 553; vol. xviii., 417; and *Journal of the Society of Arts*, vol. vii., p. 98

Home Correspondence.

ELECTRO-BLOCK PRINTING.

Sir,—The germ of Mr. Collins' process appears to have originated with Mr. J. Murdoch, who, on the 9th of March, 1855, patented a "method of enlarging or reducing designs, maps, and other similar articles, also apparatus or machinery to be employed in the same."

His mode of proceeding is thus described in his specification:—"A tracing of the design is made on a sheet of gelatine, by means of a steel point or tracer, and the surface is covered with black or other colour in paste or in powder. The surface is then wiped clean from the powder, which, however, remains in the lines made by the tracer. The tracing, thus prepared, is applied, with the black or coloured side downwards, to a sheet of caoutchouc (or other suitable elastic material), previously slightly moistened, and by means of pressure the design is transferred to the sheet of caoutchouc. This sheet is then stretched equally in every direction, until the design is enlarged to the desired dimensions. A sheet of paper, slightly moistened, is then placed upon the caoutchouc, and by pressure the design is transferred from the latter to the paper. If the design is to be reduced or contracted the caoutchouc is to be stretched before the design is transferred to it, and the design being transferred to it, the caoutchouc is allowed to shrink to the required dimensions and then transferred by pressure to the paper as before. Another method of producing the design on the caoutchouc is, to make a tracing of it on paper with a steel pen and

with ink composed of lamp-black burnt and pounded with molasses. The process may be carried out by any suitable apparatus, but the following is particularly claimed:—It consists of a smooth circular metallic table, supported on four columns. A circular tray, of somewhat larger diameter than the table, and situated beneath it, is moveable vertically by means of a screw working in the boss of the tray, and is guided by the four columns which pass through holes in the tray. The screw is turned by a train of wheel work. The sheet of caoutchouc is spread over the table, and secured to the tray by means of a ring bolted down upon the former. By drawing down the tray by means of the screw the required stretching of the caoutchouc is effected."

It is singular that the official report of a method so closely bearing upon his own should not have been observed by Mr. Collins when "all the authorities were carefully looked into before his patent was obtained."

I am, &c.,
WILLIAM STONES.

December 8th, 1860.

EFFECTS OF TEA AND COFFEE.

Sir,—It would be presumption on my part to enter the lists with Mr. Mann on the subject of his able and important paper, and it may appear equally presumptuous or me to question the authority of writers of such popuarity and repute as Johnston and Lewes. I may, however, perhaps, be allowed to state a simple fact—that the authority of these writers is more than questioned by the most able investigators of these subjects. Johnston's statements are certainly positive and explicit, but he gives no detail of the experiments from which such conclusions re drawn.

From further inquiries I find that Dr. E. Smith's elaborate researches, published in the *Transactions of the Royal Society*, and which he is still continuing, tend directly to contradict Johnston's assertions; and as, no doubt, Johnston's volumes have deservedly a place in many libraries where your *Journal* is read, it will not be out of place, perhaps, again to call attention to the subject, which is certainly one of general interest and importance.

I am, &c.,
W. SYMONS.

17, St. Mark's-crescent, Regent's-park, Dec. 6, 1860.

Proceedings of Institutions.

Manchester Mechanics' Institution.—Distribution of Prizes and Certificates.—On Monday evening, 30th November, the distribution of the prizes and certificates awarded by the Society of Arts to the successful candidates among the members of the Manchester Mechanics' Institution, at the recent examination, was made in the lecture room of the Institution. The proceedings were preluded by a social tea party of the members and friends. It was very fully attended. The chair was taken by Mr. Oliver Heywood, the President of the Institution, and the following gentleman were also present:—Thomas Bazley, Esq. M.P., M. Curtis, Esq. (mayor), Rev. William Gaskell, Mr. John Peiser, Professor Newth, Mr. Robert Rumney, Dr. Macauley (U.S. consul), Rev. William Waterhouse (Prestwich), Mr. H. R. Forrest, Mr. Lynde, Dr. Arne, Dr. John Watts, Mr. Samuel Greg, &c. &c. The Chairman said it was perfectly true that of the members of the Institution, probably only 300 or 400 were students in the particular class of subjects for which the Society of Arts gave certificates of merit; but he was anxious that they should all feel that they were members of one body. The successful students had done honour to the Institution; let the members do honour to them. Before he consented to preside, they had invited Mr. Robert Chambers, one of two distinguished brothers who had done so much solid good for the industrious classes, and Dr. Goodwin, Dean of Ely, to take that position. Failing in obtaining the attendance of these gentlemen, he had heartily accepted the invitation to preside, being anxious to make the meeting a friendly social gathering of their own members. In round numbers, they had now 1,600 or 1,700 members. Deducting those who attended the day classes, the number that remained would be about 1,100; and knocking off again 100 or 150 honorary members, it would leave 800 or 900, who formed the real body of those who were to be found in the reading and class rooms. The number of adult members was steadily increasing, which was a gratifying fact, inasmuch as it removed a reproach which was often urged against these institutions, that they were rarely attended by those for whom they were principally established. He wished to see a spirit of sociality more cultivated among them, and a greater sympathy felt for one another; so that as each could exercise some influence, that influence should be used for the benefit of his fellows. Out of the 300 or 400 students in the subjects for which the Society of Arts gave certificates, they had never sent more than 36 for examination, and 21 was the highest number that had passed an examination. The highest number of papers sent in was 42. The certificates of merit awarded to the members of this Institution this year did not compare favourably with those of the previous year. In 1859, 35 certificates were gained, and in 1860, only 31. Some of the members who had distinguished themselves last year had again earned certificates on this occasion. The Chairman, after giving some practical advice as to the course of study the student should pursue, distributed the prizes and certificates.—Mr. Rumney then addressed the meeting, suggesting the establishment of additional classes for the study of Greek, political economy, and mental philosophy.—Professor Newth spoke of the importance of intellectual culture being brought within the reach of all, irrespective of creed or sect. Knowledge should be as free and open as the light of Heaven. It was gratifying to find so many young men taking part in the examinations, and after the labours of the day employing their leisure hours in hard study. Such young men might be excused if they preferred to walk in the lighter paths of literature; but he hoped that the number of earnest workers would increase.—Mr. Samuel Greg spoke of the great power of the principle of association.—The chair was taken by the Mayor, and Mr. Bazley, M.P., proposed a vote of thanks to the chairman, expressing a hope that many would be found ready to come forward to undertake the gratuitous management of classes in the subjects mentioned by Mr. Rumney.—Mr. John Heywood seconded the vote of thanks, which was carried by acclamation.—The Chairman having briefly responded, the proceedings were brought to a close.

To Correspondents.

Erratum.—In last No. of *Journal*, page 48, col. 2, line 29, for "Railway audits," read "Rent-day audits;" and page 49, col. 2, line 17, for "maximum" read "minimum."

MEETINGS FOR THE ENSUING WEEK.

Mon. ...British Architects. 8.
Medical, 8½. Dr. Cockle, "On some points of the pathology, diagnosis, and Treatment of Insufficiency of the Aortic Valves, especially in connection with sudden death."
Tues. ...Civil Engineers, 8. Annual General Meeting.
Statistical, 8. Mr. J. T. Hammack, "On the International Statistical Congress, London, 1860."
Pathological, 8.
Wed. ...London Institution, 7.
Society of Arts, 8. Mr. A. J. Tansley, "On the Straw Plait Trade."
Geological, 8. (Burlington House.) 1. Mr. T. F. Jamieson, "On the Geological Structure of the South-western Highlands of Scotland." 2. Rev. Hugh Mitchell, "On the Old Red Sandstone of Forfarshire and Kincardineshire."

Thurs...Roy. Soc. Club, 6.
Numismatic, 7.
Linnæan, 8. 1. Dr Cobbold, "On *Entozoa*," with experiments. 2. Mr. M. T. Masters, "On Prolification in Flowers; especially on the form known as Median Prolification."
Chemical, 8. 1. Dr. Roscoe, "On the absorption of gases." 2. Dr. Bence Jones, "On sugar in urine."
Royal, 8½.
Antiquaries, 8½.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, December 7th*, 1860.]

Dated 27th October, 1860.

2624. E. Booth and Major Booth, Manchester—Imp. in machinery or apparatus for finishing cotton, linen, silk, and other fabrics and materials.

Dated 6th November, 1860.

2732. E. Salisbury, Preston—An improved mixture or solution to be applied to pickers, picking-bands, straps, sole leather, and such like materials, in order to harden them and render them more lasting.

Dated 7th November, 1860.

2734. P. W. Rennel, Plumstead, Kent—Imp. in the method of, and apparatus for, treating green, semigreen, or undried vegetables or plants, in order to reduce their fibrous portions to a pulp, and also in the application of the said pulp when so made to the manufacture of paper.

Dated 13th November, 1860.

2772. V. V. Williams, 13, Crosby-row, Walworth-road, Surrey—An improved method of constructing stands for cameras, telescopes, surveying and other instruments, parts of which are applicable to other purposes.

Dated 15th November, 1860.

2800. J. Crooke, Manchester—Certain imps. in the method or means of packing bales of goods or merchandize by means of the hydraulic press.
2802. A. Henry, Edinburgh—Imp. in rifled fire-arms.

Dated 16th November, 1860.

2814. H. G. Drewe, Chelsea—Imp. in propelling vessels, and in the apparatus or mechanism for the same.
2816. J. B. Mourguet, 6, Rue Boucher, Paris—Imp. in fire-arms and ordnance, and in projectiles used therewith.
2818. R. Bodmer, 2, Thavies-inn, Holborn—Imp. in machinery or apparatus for folding, and for folding and stitching sheets of paper and other material. (A com.)

Dated 17th November, 1860.

2830. T. M. Jones, Finchley-common, Middlesex—An improved apparatus for containing, igniting, and holding wax taper and other matches.
2832. H. MacFarlane, Glasgow—Imp. in cameras such as are used by photographers.

Dated 19th November, 1860.

2840. W. E. Newton, 66, Chancery-lane—Improved means of and apparatus for supplying air to the furnace or furnaces, or to the fire-rooms of steam vessels by means of the paddle wheels. (A com.)

Dated 20th November, 1860.

2842. R. A. Brooman, 166, Fleet-street—Imp. in stoppers for bottles, jars, and other like articles, parts of which are applicable as fastenings. (A com.)

Dated 21st November, 1860.

2846. H. D. Pochin, Oakfield-house, Salford—An improved material for building and other purposes.
2848. G. H. Cail, Southampton—Imp. in the manufacture of manure.
2852. J. Crossley, Todmorden, Yorkshire—Imp. in means or apparatus for moulding iron or other metals.
2856. L. Hienemann, Broad-street-buildings, London—Improved means whereby engine drivers and persons in charge of, or attending to, railway trains, may obtain intelligence or information for increased safety in travelling.

Dated 22nd November, 1860.

2859. J. Henry, Buchanan-street, Glasgow—Imp. in printing warps and in apparatus for the same.
2860. T. H. Keble, Margate, Kent—Imp. in fire-arms.
2861. W. H. Ralston, Keele, near Newcastle-under-Lyne—Imp. in the manufacture of hydrate of soda.
2863. W. F. Lovick, Thorpe, near Norwich—An improved bridle bit, which he terms a check-snaffle bit, for restraining vicious or hard-mouthed horses with greater facility than with any other bit.
2865. D. Auld, Glasgow—Imp. in regulating the pressure and flow of fluids.

PATENTS SEALED.

[*From Gazette, December 7th*, 1860.]

December 7th.

1416. G. Joslin, H. C. Joslin, and J. Joslin.
1427. W. Johnson & I. Adamson.
1430. P. Salmon.
1432. H. Sommelet.
1434. J. B. Farrar and J. Farrar.
1436. T. C. Yates.
1464. W. Harding.
1473. W. Clark.
1538. A. Barnsley.
1558. R. Formby.
1602. J. Johnson.
1764. C. C. J. Guffroy.
1894. J. Lancelott.
2250. W. E. Newton.
2298. R. Mushet.
2426. B. Samuelson.
2531. D. A. Leyshon.

[*From Gazette, December 11th*, 1860.]

December 11th.

1433. T. Redwood.
1435. J. Clarke.
1449. W. Weston.
1462. C. P. Coles.
1463. R. A. Brooman.
1468. W. Dray and R. Gardiner.
1470. E. Deane and W. D. Marsh.
1494. H. Wimball.
1540. J. H. Johnson.
1553. H. Cartwright.
1572. J. Sals.
1708. W. E. Newton.
1709. A. V. Newton.
1791. A. V. Newton.
1851. O. D. Hedley.
1935. A. V. Newton.
2050. J. Newall.
2347. J. H. Johnson.
2365. R. Mushet.
2378. J. T. Robinson.
2441. J. H. Johnson.
2476. J. Silvester.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, December 7th*, 1860.]

December 3rd.

3005. J. Buchanan.

December 4th.

3067. J. M. Préaud.

December 5th.

3020. W. T. Henley.

[*From Gazette, December 11th*, 1860.]

December 6th.

3030. J. Harris.

December 8th.

3042. T. W. Willett.
3053. S. Biggin and J. Biggin.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, December 7th*, 1860.]

December 4th.

2823. M. A. Muir.
2839. A. V. Newton.
2912. J. B. Pascal.

December 6th.

2834. W. E. Gaine.
2837. J. Bernard.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Registry.	Date of Registration.	Title.	Proprietors' Name.	Address.
4300	Nov. 9	Improved Pickle Fork	Sherwood and Barrett	52, Gt. Hampton-street, Birmingham.
4301	„ 10	The Segment Table, being a Stand to apply to Endorsing and Embossing Presses	Maurice Samuel Johnson	3, Wardell-terrace, Doctors'-commons, E.C.
4302	„ 15	The Gun Knife-Cleaner	Robert James Ransome	Ipswich.
4303	„ 15	Knight's Gold Leaf Receiver to prevent superfluous leaf being wasted	Charles Johnson Knight	23, London-wall, E.C.
4304	„ 15	Improved Ship or House Lantern	P. J. Marshall	32, Treville-street, Plymouth.
4305	„ 16	H. Fence Standard	Kennan and Sons	18 and 19, Fishamble-street, Dublin.
4306	„ 19	A Drinking Flask, to be called the Rifleman's Flask	Farwig and Co.	65, Watling-street, E.C.
4307	„ 21	Safety Bow for Watch Pendents	Ellis, Brothers	High-street, Exeter.
4308	„ 22	A Revolving Disc for Boot Graters	Gervaise Bushe	Glencairne Abbey, Lismore, Ireland.
4309	„ 23	Paragon Trousers	William Chesworth Caldwell.	19, King's-place, Commercial-road, St. George's East, E.
4310	„ 27	Rack Pulley	William Tonks and Sons	Birmingham.
4311	Dec. 1	A Volunteer Sandwich Box	John Freeman	53, St. Martin's-lane, W.C.
4312	„ 3	Cigar Holder	John Webb	21, Aldermanbury, E.C.
4313	„ 4	Towel Holder	Richard Telford	15, Wrottesley-street, Birmingham.
4314	„ 7	Adjustable Fastening for Plough Coulters.	Tasker and Sons	Waterloo Iron Works, Andover.
4315	„ 8	Horse Cloth or Skirt	John Hargraves and Son	Carlisle.

Journal of the Society of Arts.

FRIDAY, DECEMBER 21, 1860.

EXAMINATIONS, 1861. — NOTICE TO INSTITUTIONS AND LOCAL EDUCATIONAL BOARDS.

The attention of Secretaries of Institutions and Local Boards is specially called to Par. 5 of the Programme of Examinations for 1861, as follows:—

5. A detailed list of the chairman, secretary, and other members of each Local Board, giving not only their names but their addresses and designations, should be submitted to the Council of the Society of Arts before the 1st of January, 1861. In some cases the Local Educational Boards comprise such large districts that for the convenience of the Candidates, Branch Local Boards have to be formed within the Districts. Wherever this is the case, the names and addresses of the members, both of the District Board and of its Branch Boards, must be forwarded to the Secretary of the Society of Arts. All changes in the composition of the various Boards now in existence, or to be formed hereafter, should be immediately notified to the Society of Arts.

FIFTH ORDINARY MEETING.

Wednesday, December 19, 1860.

The Fifth Ordinary Meeting of the One Hundred-and-Seventh Session was held on Wednesday, the 19th inst., John Dillon, Esq., Vice-President, in the chair.

The following gentlemen were proposed for election as Members of the Society:—

Bertram, George	Sciennes-street, Edinburgh
Bucknall, William Miles	Board of Trade, Whitehall, S.W.
Budgett, John P.	Henleaze-park, Westbury-on-Trym.
Chambers, Charles	Broomfield-park, Sheffield.
Goldschmidt, Otto	Argyle Lodge, Wimbledon-common, S.W.
Hands, Medwin	4, White-street, Coventry.
King, John Huffam	66, Hatton-garden, E.C.
Knott, William	Bentcliffe, Saddleworth, near Manchester.
Leahy, Francis	Shanakiel House, Cork.
Lorsont, Jean Baptiste Athanase	56, Cannon-street west, E.C.
Moody, William	6, King's Bench-walk, Temple, E.C.
Pakington, J. Slaney	Kent's-green, Worcester.
Richardson, Samuel	Doncaster-street, Sheffield.
Robinson, George	Water-street, Dock-yard, Cork.
Thompson, M. W.	Park-gate, Guiseley, Leeds.
Veitch, James, jun.	Exotic Nursery, King's-road, Chelsea, S.W.
Wood, George	Bradford.

The following candidates were balloted for and duly elected Members of the Society:—

Andrew, W. P.	26, Montagu-square, W.
Harrison, Archibald Stewart	133, Upper Thames-street, E.C.
Heath, T. Vernon	43, Piccadilly, W.
Moate, C. R.	65, Old Broad-street, E.C.

The Paper read was—

ON THE STRAW PLAIT TRADE.

By A. J. Tansley.

Bedfordshire has long been celebrated for the production of beautiful wheat straws, suitable for the purposes of plaiting. The first straws used for the making of plait in this country were grown in the neighbourhood of Luton. Straw-growing now extends throughout the southern part of the country, in the valleys and along the slopes of the Chiltern hills, and also in parts of Hertfordshire, Buckinghamshire, Oxfordshire, and Berkshire. The best soils are light but rich; the stiff clays, being unsuitable, will not produce good straws. Some soils that would produce good straws but not yield a fair crop of wheat, are only cultivated for the latter, but those yielding both prove very advantageous to the farmer. The seed used is either that known as red lammas or white chittim wheat, according to soil and aspect, and is sown broadcast or drilled according to circumstances, and cultivation is carried on in the usual manner. When harvest draws nigh great care is required by the grower, it being necessary to commence cutting before the flag of the straw falls. If very wet and stormy weather sets in, the straws become rusted or spotted; or, if opposite weather, dry and hot, and the crop remains uncut, the straws change to red and become harsh. The first favourable opportunity is taken, extra hands are set on, the crop is rapidly cut, laid out to dry before being tied into sheaves, carted and stacked with all despatch as soon as ready. The result of this attention is in general seen in obtaining bright and clear straws that will repay the farmer for all his trouble. An acre of wheat will yield in a good season five to eight loads of wheat, of five bushels to the load, and from fifteen cwt. to a ton of cut straws, of the value of six to eight pounds sterling the ton, clear of all expenses. At the present time the price is double, for owing to the past wet and stormy summer, good straws are very scarce, many of the best growers, with all their care, having lost their crops.

The farmer disposes of his straw to men known as straw factors; these draw and cut the straws in his barn. Each sheaf is taken between the knees, and the straws are drawn out a handful at a time; the ears are then cut off and carefully laid together on one side. After a sufficient number have been drawn and cut, large bundles are formed, weighing 20 to 25 lbs., and these are carted to the home of the factor, to undergo another "cutting" process, which is generally performed by boys, who earn form 2s. to 5s. per week. In the act of cutting each straw the sheath in which it is encased is taken off. Two joints of the straw are preserved for plaiting, the other, or root joint, being cast away.

Straws thus cut are next subjected to the fumes of sulphur in a close chest, "steamed" as it is termed, and afterwards sorted by hand into proper sizes. Of late years sorting is performed by a hand-machine similar to a sieve; the straws, being held in an upright position, fall through holes of a uniform size. A final sorting takes place, when discoloured or spotted straws are thrown out, which, however, are not altogether wasted, as they answer for dyeing in some cases. Marketable bunches are formed of the various sizes and qualities, the bundles so made up fetching one halfpenny to one shilling per bunch; they are afterwards sold to the plaiters at the various markets of the districts, or in the immediate neighbourhood, the factors always residing within the plaiting districts.

There are straw-growing districts in Essex, but as the soil is unfavourable for the growth of good straws, great quantities are sent there to be made into plait from Bedfordshire and the other districts.

The growth and preparation of straws are most important branches of the "straw trade," and to the attention given to them during the last fifty years, much of the excellence of English-made plait is to be attributed. The districts were originally limited, but the advantages of straw-

growing have led to the present large extension of the districts in the counties enumerated, the possibility of obtaining a good crop of wheat, with a good crop of straws, having led on many a farmer to their successful cultivation.

Straw Plaiting.

The art of making plaits from wheat straw was first introduced into England about two and a half centuries ago. In Agnes Strickland's "Lives of the Queens of Scotland," we read that Mary Queen of Scots, when travelling in Lorraine, in France, noticed that women and children were employed in the plaiting and making of straw hats, and in the districts where this light and pleasant handicraft was practised, the peasantry were much better off than in other parts where it was not. It is said that the thought struck her that the introduction of this useful art into Scotland would be attended with much benefit to her own subjects. She therefore prevailed upon some plaiters to return with her to Scotland; this was about the year 1562. The troubles in which she was afterwards involved prevented her fully accomplishing her object; but her son, James I., took a lively interest in his mother's plaiters, and transplanted them to Luton, in Bedfordshire. While, however, they remained in Scotland, they taught their art, and plaiting still survives to the present day in the Orkney Islands, though the quantity now made there very limited.

These plaiters are supposed to have arrived in England about the year 1603, and must have taught the peasantry the art of making whole-straw plait. About a century after this, it is stated in "Oldmixon's History of England," that plaiting had, in 1724, greatly extended, and that several thousand plaiters found profitable employment both in Bedfordshire and Hertfordshire. In the reign of Queen Anne, large quantities of hats were made from the whole-straw plait, a taste for hats having sprung up at Court, as shown in the costumes of that reign in the milkmaid hat, and later, in the succeeding reigns of the Georges, in the gipsy hat. The heaviness of the article, however, led to efforts for improvement, in order to produce a lighter description. At first the contrivances for the splitting of straws were of a clumsy character. Some plaiters, indeed, cut the whole straw with a knife, and made a kind of split plait, which realised as much as a shilling per yard, or 20s. per score (at the present time it would be about 4d. per score). A considerable quantity of fancy work was made about this period at Dunstable by straws, so cut, being made into what was called "laid-work." It consisted of the split straws being flattened, and afterwards pasted on wood or other firm substances; various pretty and useful articles in the shape of baskets, work-boxes, mats, &c., were thus made. Dyed straws were introduced, forming variegated patterns, and many other ingenious devices, and these were sold to the passengers passing through that ancient thoroughfare in the days of coaching. Many hats were made at the same period, and together with the fancy work, brought Dunstable into notoriety in connection with the straw trade; hence the names of Dunstable plait, Dunstable hat, Dunstable bonnet.

The efforts at splitting straws made at Dunstable in the "laid-work," and around Luton, were not successful in discovering a proper instrument. Who it was that at last succeeded in the invention of that most important and useful little "machine," as it was named, the straw splitter, cannot now be traced, but it is generally supposed that the French prisoners at Yoxley Barracks, near Stilton, first made it in bone, between the years 1803 and 1806. It was about two inches long, brought to a point, behind which a set of cutters was arranged in a circle; the point entered the straw pipe, the cutters separating it into so many equal-sized splints. Some were arranged to cut a straw into four parts, others five, and so on up to nine. This instrument was soon imitated, and being of such surprising utility, numbers were speedily made, and fetched as much as from one to two guineas each. A blacksmith at Dunstable, named Janes, made them in iron, and turned the end downwards at right angles with the stem, the cutters being placed immediately above the point. This soon after became the general form in which it was made, with the same varieties of cutters as at first in bone. A few years afterwards, about 1815, others were made like wheels, and inserted in a frame, the points projecting in front of each; by this arrangement four or five splitters could be fixed in one frame. As these instruments became common, and were made in brass, the price being about sixpence each, the making of split plaits with facility was placed within easy reach of the plaiters. To this invention may be attributed the success which, in after times, has attended the manufacture of straw plait in England.

The first split plait was made of seven straws, and it fetched as much as 12s. per score. Many amusing accounts have been handed down of persons called "dealers," collecting it of the plaiters five yards at a time, meeting them on their way to market as early as three or four o'clock in the morning, and making great efforts to obtain it. Prices continued high for many years. Other kinds were also invented, called rustic pearl, Italian (made of eleven straws) diamond plait, and other fancy kinds. Much plait was also made by the French prisoners at Stilton, about the year 1810. The plait they made was purchased by persons from Luton, who, at much risk, succeeded in holding communication with them.

Bonnets made of split straw succeeded rapidly in displacing the whole-straw Dunstable hat, and continued a favourite article of fashionable wear for a long time, but Leghorn hats eventually interfered with them. Chips also had a considerable sale. About the year 1820, Leghorns were largely imported into England from Italy, by Mr. Thomas Vyse, of London, and their sale was very great for many years, the prices varying from two to four guineas each.

The great demand for Leghorns led to many attempts being made to produce an article resembling them in England. Correspondence was carried on by the Society of Arts with certain persons who were attempting to accomplish the object, and every encouragement was offered by the Society to parties trying to grow straws like those in Italy, and then making a similar article to the Leghorn hat, in order to increase the home manufacture. A Mr. Parry received the Society's large silver medal in 1822, for his method of manufacturing Leghorn plait from straw imported from Italy. No person succeeded so well, however, as the late Mr. Thomas Waller, of Luton, in his efforts to find employment for the population of his native town. This gentleman at first imported seeds of the Italian wheat, and endeavoured to raise straws from it in the neighbourhood of Luton, but though not in the end successful, being beaten by the uncertainty of our climate, and the want of sufficient heat in our atmosphere, he hit upon the expedient of using straws which he imported from Italy, in making eleven straw plaits in the English style. The plaiting of eleven Tuscan straws, with the straws set out evenly at the lower edge, and not in the middle as Leghorn plait, was the new feature of his peculiar manufacture; the plait so made was a great success, and through his invention he obtained a patent for a bonnet, called by him the "Tuscan Grass Bonnet," which was afterwards patronised by Queen Adelaide, and great numbers were sold all over the kingdom at prices from 30s. to 50s. each.

Large importations of Italian straws were made by him, and many thousand persons in a few years were employed on the new plait. Eventually, the same kind of plait from Italy much interfered with the home-made; but, notwithstanding this, English-made Tuscan employed many thousand of plaiters, both in Bedfordshire and Hertfordshire, for many following years.

From the time of making the first single plait, called split, at the commencement of the present century, many fancy kinds of plait were invented in the split straw; the plait called "corkscrew" was one, and a bonnet made from it was worn by Lady Bridgwater. Similar fancy

plaits and trimmings followed. About 1820, a new kind of plait, more durable, and with a surface more glossy, was invented, and it may be said to have been the parent of most of the numerous kinds that afterwards came up. This new sort was formed of seven double straws, two splints with their pithy or inner sides being laid together after having been flattened, and thus a "double" straw was made, forming a smaller and lighter thing than the whole pipe, however fine. Seven of these doubled straws, being plaited, formed the new plait termed "Patent Dunstable." This invention was followed by another and broader, and termed "improved." Another, formed of eleven doubled straws, from a fine splitter, was named "Bedford Leghorn," and one with 15 doubled straws was named "Rutland." All these plaits realised very high prices when they first came up. These four kinds were soon after made into rice-straw plait. This novel kind differed in this important particular, that the straw was reversed, the inner or pithy side being worked outwards, and the natural or bright side worked inwards. This kind, in after years, had an immense sale, and some of the finest, which resembles chip to a great degree, was made up for wedding bonnets. About this time, 1820 to 1830, much broad single plait was made, called "Italian," "Devon," and broad pearl or rustic, from which the cheapest straw bonnets of the day were formed. The making of these varieties found employment for great numbers of plaiters, and being more profitable than lace-making, many of the children of lace-makers were taught this more valuable art.

Between the years 1844 and 1850, other and more important plaits were invented. An idea occurred to a straw-plaiter of turning the straw on the upper edge in such a manner as to form a bead or pearl, and by working each pearl along the edge at every other straw, the plainness of the edge was broken, and a new plait was formed, of a pleasing appearance. This plait was found, when made into bonnets, to give quite a new feature to them, and led to the general making of this plait wherever plaiters had sufficient skill. The pearls were afterwards doubled, two being formed one next the other. A third, with three pearls, was soon after invented, and these plaits were respectively named one-pearl, or China pearl, two-pearl, and three-pearl; the last named, three-pearl, or rock edge, having proved most useful; it was afterwards called Cobourg. These same descriptions were subsequently made in eleven straws. Some had the straw worked over a wire, and were named moss-edge plaits. One most useful sort was worked every straw over a wire, and was named satin piping, or Vienna. Others had their edges worked so as to imitate a feather, and hence were named feather-edged. Another sort was made of eleven straws, open in the middle, like lattice work, and was named Brussels. Another, similar in some respects to the last, was called birds-eye. Much plait in seven and eight straws had been made, composed of coloured and white straws mixed together, and made in a variety of patterns. These plaits being cheap, and bonnets made from them of economical wear, great quantities of plait were used, and employed numbers of children in the plaiting districts. But the most important of double plaits is that termed twist edge, and made within the past fourteen years. This plait was also named whip-cord edge, from the fact of the straw being whipped over as it were. It is also made in whole-pipe seven and eleven straws, and is a staple article of English wear, forming the true straw bonnet, by exhibiting English straw to the best advantage. The discovery of this valuable plait has been attended with happy results, as it is a description capable of being used in almost every kind of hat or bonnet.

These various descriptions of straw plaits have enabled the trade to produce so many novelties that Tuscan plaits for bonnets declined as articles of wear, the beauty of English straw plaits, as displayed by these new patterns, leading the public to give them the preference; and although the lowering and afterwards abolition of the duties on foreign Tuscan brought that article into competition with the English straw manufacture, no injury has been sustained by the straw trade. Tuscan is chiefly confined to girls' hats at the present time, and its low price since the removal of the duty has completely abolished the making of Tuscan plait in England from Italian straws.

The plaits now enumerated of English make from the wheat straw were those shown at the Great Exhibition in 1851. At that concentration of the best productions of the plaiting districts, the skill of the English plaiter was fully shown. From that date plaiting has continued to progress, not so much in the invention of a number of new plaits, as in the superior quality and extent of the manufacture. The newest feature is the production of various coloured plaits of excellent patterns, suitable for ladies' hats, the last and popular colours being produced in mixed and dyed plaits, as mauve, magenta, &c. Many valuable patterns have been made by mixing rice straw with dyed straw, as rice and black, rice and mauve, rice, black, and brown, and similar patterns.

The progress made in English plaiting up to the present time (1860), has been thus remarkable in the varieties produced to meet the public taste and the necessities of the million. And although foreign straw plaits from Belgium, Germany, and Switzerland, have been brought to compete with them, they have nearly all failed in this respect. A few single plaits of a choice character are used for white goods, but the greater portion, from the inferiority of their colour, are only suitable for use when dyed.

Straw plait is a domestic manufacture, carried on in the cottages of the agricultural labourers of the three counties of Bedfordshire, Hertfordshire, and Buckinghamshire, and portions of Essex and Suffolk. The plaiters are generally the wives and children of the labourers; a few are men. No plait is made in factories.

Children are taught usually in schools, and are sent at the early age of four years; besides plaiting, they are taught the simple elements of spelling and reading. In most villages there is a plaiting school, which is generally conducted by an elderly dame, who receives from each scholar 2d. or 3d. per week. The children are some time before they can plait so as to earn anything, but after a year or two they contrive to obtain 6d. to 1s. 6d. per week, after their plait is disposed of by their parents. They remain at school the usual school hours; afterwards, during the time they do not play, they plait a little till sent to rest. They continue working at school till they can plait sufficiently well, and when they are above eight or nine years they earn 2s. to 3s. per week. On leaving school, they earn 4s. to 5s. if expert plaiters, and after they become skilful they may obtain as much as 7s. Many learn to sew if near Luton or Dunstable, and then leave their cottage-home for the greater attraction of hat and bonnet sewing, a sewer being considered a step above a plaiter; and one who may exhibit an amount of personal adornment, to which a simple plaiter would not dare to aspire in her village-home.

These young persons, when first at school, are not much looked after as regards the proper attainment of the very rudiments of knowledge, except in those cases where the schools are under careful visitation by the minister of the parish, or by persons in the neighbourhood. The difference between visited and unvisited schools is of a marked character; the comfort, health, and education of the children, as well as their plaiting, being attended to; and, as a consequence, they are more healthy, and their minds more active and vigorous than at those schools which are unvisited and uncared for. It may be safely affirmed of the greater number of these schools, that the children taught within them are altogether lost sight of by the wealthy and other classes around them.

Plait is made all the year round, except during the interruption of harvest time. The plaiters do but little then, especially when the time of gleaning arrives. In winter plait is made indoors, and as the splints have to be worked in a partially wet condition, it is cold work for the fingers.

When plaiting near the fire the straws are liable to injury; winter-made plait is never so good as when it is done in spring and summer, away from the fire or in the open air, at the cottage door, or along the green lane.

The earnings of plaiters vary much according to the time devoted to it. Unmarried women, who are skilful and quick, earn the most, but some married women contrive to do pretty well; and a well-ordered family will obtain as much or more than the husband who is at work on the neighbouring farm; in this respect plaiting far exceeds lace-making. The earnings of a good plaiter, after the straws are deducted, will be from 5s. to 7s. 6d. per week, in a good state of trade.

The plaiting districts are now wide spread; each district has a plait market as its centre. The chief markets are Luton, Dunstable, Hemel Hempstead, and Hitchin. There are nine lesser markets, and they all begin at a fixed hour in the morning, a bell being rung to announce the commencement. The districts do not all produce the same descriptions, plain plaits being the product of one locality or district, fancy of another.

It is computed that the number of females engaged in plaiting, and boys up to eight years of age, would now be near to 50,000, and the number of yards annually made 200,000,000, or 10,000,000 scores of plait of every description.

Plait is sold by the score of 20 yards, at from 2d. to 3s. per score, and is done up in double links of 17 inches in length,* 20 such forming the score. One week's work is generally disposed of at a time by the plaiters, either at market, or to dealers living near to them. In some cases several weeks' work is kept before being disposed of.

The measure of plait till recently was very deficient, being frequently but 17 or 18 yards, or even less to the score. Of late years an association for the suppression of this evil has been established, which has been attended with most beneficial results, the measure being now very near the just standard.

The number of towns, villages, and hamlets embraced by the districts, is computed to be between 190 and 200. Of the towns, there are Luton, Dunstable, St. Albans, Hemel Hempstead, Chesham, Tring, Leighton Buzzard, Ivinghoe, Toddington, Ampthill, Shefford, Baldock, and Hitchin. At each of these towns there is a plait market, to which the plaiters come from distances varying from one to six miles. The plait is sold in the open market, beginning at 8 o'clock in the summer and 9 o'clock in the winter. At these markets straw dealers attend, and from them the plaiters obtain their straws when they do not purchase them nearer home.

The Straw Plait Trade.

Plait, after being collected by the dealers (of whom there are from 150 to 200), is brought for sale to two markets, Luton and Dunstable, but chiefly to the former town. Luton market is held on each Monday throughout the year, and as such large quantities of plait are disposed of, it is attended by almost all the trade; from 150,000 to 200,000 score are sold in busy times on a single market day. Marketing extends in general over three hours.

Plait, after being purchased of the dealers, is either bleached or dyed. Till within the last eight years it was chiefly bleached, but owing to the immense sale of black, brown, and other self-colour hats, the quantity that is dyed is at some parts of the year greater than that bleached. The dyeing of plait is now a most important branch of the trade, and to the first dyer of plait the trade is greatly indebted. This person was a Mr. Thomas Randall, of Sundon, near Luton. Pipe straws were dyed by him, and by Mr. Wright, of Hemel Hempstead, many years before plait was dyed a self-colour, but the honour of the application of dyeing to plait belongs wholly to Randall. Had he secured it by patent he would have retained it for a long time in his own hands, but as he did not, plait dyeing in a few years was practised by other persons, who now employ many men and boys, who otherwise could hardly have found employment in the trade in other occupations.

Plait dyed or bleached is chiefly sewn into hats or bonnets at Luton or Dunstable, or is exported; the greater portion is, however, required for home consumption. Very little was formerly sewn up at Luton or Dunstable. Up to the year 1835, the Luton trade consisted in plait more than in bonnets, which plait was sold all over the United Kingdom for bonnet making. But the cheapness of Luton bonnets, and their superiority over others made by the bonnet milliners, gave rise to the present trade. The first manufacturer who gave a start to the Luton bonnet trade was the late much-respected Mr. Edward Waller, who, by his enterprise, laid its foundation. His brother, Mr. Thomas Waller, helped much in this direction by the excellency of his productions in Tuscan bonnets. About the same period, 1830 to 1840, branch establishments were opened in Luton by London firms, as Vyse and Sons, Gregory and Cubitt, Welch and Sons, Munt and Brown, the first-named firm especially helping to bring Luton manufacture into reputation. A good deal was being done at Dunstable in bonnet and hat making about the same time. At the early period of bonnet making in Luton, other materials were used in their construction besides straw, as chip and sewn willows, the latter having been first woven in a loom, afterwards dyed black, and then the cut strips were sewn into bonnets and carefully pressed; hence the cheap willow bonnet. The making of Tuscan bonnets was a very important branch also.

Further improvements in shape, superiority of colour and finish, continuing throughout a series of years, brought the Luton trade to its present perfection, and have been the causes of the present extensive English and foreign business. Luton was described by Boswell, in 1781, after his visit to Lord Bute's, at Luton Hoo, as a "village," by after writers as "a small dirty town in Bedfordshire." In 1801, the census showed 3,095 inhabitants; in 1841, 7,740. In 1851, it had risen to 12,783; at the present time it is well drained and paved, and is supposed to contain about 18,000, and will in another year or two amount to 20,000, if its trade still keeps enlarging. As would be supposed, the females out-number the males, but not quite to the extent some imagine.

The sewers of Luton are divided into two classes, those employed in the rooms of the manufacturers, or who are employed directly by them out of doors working at home, all of whom are under direct control; and those who are employed on "sale work" on their own account, and who are their own masters. More are employed on "sale work" than in rooms. There are many persons of respectability who employ 10 to 20 or 30 sewers, and dispose of their goods likewise to the warehouses. Of the whole population, 12,000 are supposed to be occupied directly in the trade, the remainder being chiefly dependent upon it indirectly.

Of the class of sewers employed by the manufacturers the most skilful are the room hands. Their earnings are excellent, and superior to any similar class in the kingdom some two thousand or more are engaged in the room work, and their hours commence at 9 o'clock in the morning, and in general terminate at the same hour in the evening; they are all employed upon piece work, and have to sew up the plait or other material to a given shape and size of hat or bonnet. They are not strictly confined to the rooms when at work, as in the cotton factories of the north. The rooms are in general provided with every comfort and convenience for carrying on their work and for preserving health, some masters taking especial care in this respect. As a body, they may be considered virtuous and industrious, betokened by their neat attire and good behaviour. Their earnings in the season vary from 8s. to 12s. for the medium hands; 12s. to 15s. is obtained by those employed upon the best plain goods; and best fancy hands can obtain from 16s. to 20s. per week; these earnings are subject to variation with the fluctuations of the trade.

* An additional inch at each end is taken up in the bend, making 36 inches in all.

Many of this class return home in July and August for a holiday, coming to work again in September. Numbers come from considerable distances, as far as 30 to 60 miles. It is not a matter of surprise that out of so large a body there should be found many that are unsteady, being out of reach of parental control; they are, however, exceptions. Numbers are teachers in the various Sunday-schools, and many of the younger ones are scholars. Some attend week evening services at Church or Chapel, and on other evenings the "Young Women's Institute," where there are a library and periodicals for their use; in the season there are concerts of an excellent character once a fortnight, under the management of the Luton Harmonic Society, the admission to which is but trifling, in order to place its advantages within their reach. There are also saving societies and sick clubs, to which numbers belong.

The other and larger class of sewers are those engaged upon "sale work," and as this is the commonest description, their earnings are in proportion. The goods are in general sold by them to the warehouses at the end of the week. Almost every poor family is employed upon this kind of work, and their earnings vary very considerably; but, on the whole, more is obtained than by the plaiting families of the surrounding districts. As this class of the population is very numerous, they are subject more suddenly to the changes of trade, their productions frequently being in excess of the demand. In good seasons their earnings are excellent, but during the past twelve months they have suffered greatly from the depression of trade caused by the wetness of the season. As a body, they are not remarkable for providing against the reverses of trade, any more than similar classes elsewhere. Many young persons come into Luton to work for them in order to learn the art of sewing; and from these and others who are not under sufficient control, those instances of thoughtlessness arise which startle strangers visiting the town. The immorality of many of the females thus employed upon the staple of the town may in part be attributed to its non-factory character; so many working for themselves, and not being in the employment of the manufacturers, the latter cannot be considered accountable for the vanity and frivolity displayed by them. But while there are these instances of youthful folly, the industry of the mass of the population is great, as may be seen when it is considered that the "sale work" amounts to nearly five millions of bonnets and hats within a twelvemonth. So vast has the trade become, and so industrious are the fingers that ply the needle, that articles of cheapness and utility are the result of their industrial occupation, such as no other town, unaided by machinery, in the kingdom can exhibit.

The earnings of those employed upon sale work vary much. Children earn 2s. to 3s. per week; girls and women 5s. to 8s. per week. Boys in some cases also sew, and some men in the winter season, when other employment is scarce.

The male part of the population engaged in the trade are boys and lads, employed in bleaching, dyeing, and brushing plait, earning 5s. to 8s. per week; men at the same earning 12s. to 15s., and the large and important class of blockers or pressers earning 20s. to 30s. per week.

The Luton productions of the superior descriptions are manufactured in the work-rooms, and amount to from two to three millions of bonnets and hats annually.

Of late years much valuable material has been worked up at Luton, either alone or with English straw. These materials consist of foreign and St. Albans'-wove trimmings, and that most important article from Switzerland, hair braids or embroidered hair braids and trimmings, commonly known as crinoline. Similar hats and bonnets are made up at Dunstable; and the two towns, now connected with each other by railway, and at so short a distance, may be considered as one in the superiority of their manufactures; though "sale work" is produced at Dunstable, in a very small degree.

The "straw trade," in all its numerous ramifications, is most extensive, and when the bonnets and hats now made in London from Bedfordshire and other straw plait are added, the annual returns will not fall short of one and a quarter millions sterling.

During the past 15 years a large shipping trade has been carried on, chiefly, in the first instance, with the United States of America; later, in addition to this, large quantities of English straw goods have been shipped to Canada, Australia, the West India Islands, India, the Brazils, and to the Continent; and while France supplies England with her newest fashions in bonnets, she in return is supplied with the latest fashions in hats from England.

Before closing the subject, it is necessary to notice the novel but useful invention of mixing white cotton braids, now made chiefly at Manchester, with straw plait. In the first instance the white braid was made up alone, as is still done for some descriptions of bonnets. The introduction of this new material is referred to the Messrs. Woolley, Sanders, and Co., of London and Dunstable. The bonnets made of the braid are whiter by far than those of chip, and are often preferred for wedding bonnets. The finest braids are named chip braids.

From the foregoing statements the trade of Luton, and the straw trade generally in England, is exhibited as assuming greater importance every year. Luton is now in direct communication with the metropolis by means of the Great Northern line, the Luton branch railway joining the main line near to Hatfield. This important advantage is likely to develope still more the straw trade of Bedfordshire, by placing the emporium of it, Luton, within easy reach of all travellers. It is in communication with the North by means of the railway to Dunstable and Leighton. In addition to the straw trade of Bedfordshire, there is the Brazilian hat trade of St. Albans, which employs about 1,800 persons in the town and neighbourhood, and in other branches of hat-making, forming the staple trade of that town.

The population of Luton is fairly supplied with day schools; and with Sunday schools added, it may be said the young are far from being neglected. In the day schools at the present time there are 1,169 scholars, and 510 attending night schools. In the Sunday schools there are 3,015 scholars and 313 Sunday school teachers. There are eight places of worship of all denominations, which are in general well filled on the Sunday, capable of accomodating 8,000 persons.

DISCUSSION.

The SECRETARY stated that the Society, at a very early period of its existence took a considerable interest in the straw plait trade. In 1805* the Gold Medal was voted to Mr. Wm. Corston, of Ludgate-hill, for his invention of a substitute for Leghorn plait for hats. In his communication to the Society he states that large sums are remitted to Italy, Germany, &c., for the purchase of Leghorn plait, and that the annual importation of this material for the preceding ten years would furnish employment for 5,000 female children and young women, and give cultivation to 2,000 acres annually of poor land for raising straw, unfit for other culture. He claims to have produced specimens of a manufacture never before made in this country. The straw used by him was rye straw, and the specimens sent to the Society were made in a school he had at Fincham, in Norfolk. Mr. Corston subsequently, in 1810†, described the progress he had made in carrying out his manufacture, and points to the importance of thus turning any waste land (Bagshot-heath, for example) to account. The large Silver Medal‡ in 1822 was voted to Mr. John Parry, of Little Mitchell-street, Bartholomew-square, for the manufacture of Leghorn plait from straw imported from Italy. At that time there was a duty of £3 a dozen on the importation of hats, and a lighter duty of 17s. a lb. on plait not made up, and a duty of 5 per

* Transactions of the Society of Arts, Vol. xxiii., page 223.
† Trans., Vol. xxviii. p. 130.
‡ Trans., Vol. xl., page 222.

cent. *ad valorem* on straw not plaited. Mr. Parry, it appears, made himself acquainted with the art of plaiting in Italy, and describes the method of doing it, and also the mode of "knitting" or joining the plaits.

In the same year,* this Society gave its Silver Medal and twenty guineas to Miss Sophia Woodhouse (afterwards Mrs. Wells) of Weathersfield, in Connecticut, for a new material for straw plait. The material she used was the stem of a species of grass growing spontaneously in that part of the United States, popularly known by the name of "ticklemoth."

The hats sent over were pronounced, by those engaged in the trade, to be superior to Leghorn for fineness of material and beauty of colour. The medal was granted on condition of Miss Woodhouse sending over seeds of the grass. The seeds were sent over, and were distributed by the Society for cultivation.

In 1823,† the large Silver Medal was awarded to William Cobbett, of Kensington, "for the application of native English grasses as the material of fine plait." He states that he obtained seed of the grass used by Miss Woodhouse, which he alleged to be the *Poa pratensis.* He found this grass could be grown in England. He, however, used various native straws and grasses—viz., wheat, *Melica cœrulea*, *Agrostis stolonifera* (a sort of couch grass), *Lolium perenne* (rye grass), *Avena flavescens* (yellow oat grass), *Cynosurus cristatus* (crested dog's tail), *Anthoxanthum odoratum* (sweet-scented vernal grass), *Agrostis canina* (brown bent grass).

The bleaching was the difficulty he had to overcome, and in this he states he had fully succeeded. In the Society's Transactions will be found a detailed account of the methods he adopted.‡

In 1824, the Transactions (Vol. xlii., p. 74) record that rewards were given as follows:—

The premium of fifteen guineas was given to Lucy Hollowell of Neithrop, near Banbury, for two bonnets manufactured by her of the crested dogs'-tail grass, (*Cynosurus cristatus*). The grass was prepared and bleached according to the instructions printed by Mr. Cobbett. Up to February, 1824, it appears, from the accompanying certificate, that she had made thirty-five ladies' bonnets and two gentlemen's hats.

The premium of fifteen guineas was given to Mrs. Morrice, of Great Brickhill, Bucks, for a bonnet made by her of crested dogs'-tail grass.

The premium of fifteen guineas was given to Priscilla Surrey, of Harpingden, Herts, for a bonnet made by her of meadow fox-tail grass (*Alopecurus pratensis*).

The sum of ten guineas was given to Betty Webber, of Clatworthy, Devon, for a bonnet made by her of crested dogs'-tail grass.

The sum of ten guineas was given to Mrs. E. Mills, of Bath, for a bonnet manufactured by her, as well as for instructing several poor persons in the same art.

The Silver Ceres medal was given to Mary Marshall, mistress of Lady Bernard's school at Bandon, near Cork, for a bonnet made by her of crested dogs'-tail grass.

The sum of five guineas was given to the children of the school at Bandon, mentioned in the preceding article, for their proficiency in platting under the instruction of Mary Marshall.

The Silver Ceres Medal was given to Messrs. James and A. Muir, of Greenock, for a hat face and thirty score of plat of different qualities. From the letter accompanying their specimen, it appears that they were endeavouring to establish, on a large scale, a manufacture of hats plaited and knit in the same manner as those imported from Leghorn. The material which, in their opinion, answered the best (and of which the specimens sent were formed), was rye straw dwarfed by being grown on poor land. The plaiting was performed by women and children in the Orkneys.

The Silver Ceres Medal was given to Mrs. Mears, of Durley, Hants, for a bonnet of crested dogs'-tail grass plaited under her direction and knit by herself.

The Silver Ceres Medal was given to Mrs. Venn, of Hadleigh, Suffolk, for a bonnet made of crested dogs'-tail grass.

The Silver Ceres Medal was given to Miss Mary E. Collins, of Dublin, for a small hat made by her of yellow oat-grass, (*Avena flavescens*).

The Silver Ceres Medal was given to Mrs. Pyman, of Coombs, Stowmarket, for a bonnet made under her superintendence, of crested dogs'-tail grass.

The Silver Ceres Medal was given to Messrs. Cobbing and Co. of Bury St. Edmonds, for two bonnets, a fine one made of crested of dogs'-tail grass, and a coarser one made of underling wheat.

The sum of five guineas was given to Mrs. E. Bloomfield, of Bury St. Edmonds, for a hat made of crested dogs'-tail grass.

The sum of five guineas was given to Mrs. M'Michael, of Penrith, Cumberland, for a bonnet of grass in part procured from Mr. Cobbett, and in part prepared by herself.

The sum of two guineas was given to Jane Hurst, of Leckhampstead, Bucks, for a bonnet made of bent grass.

The sum of two guineas was given to the children of the national school at Nunney, near Frome, for a bonnet made of cats'-tail grass, (*Phleum pratense*).

All the specimens mentioned above are stated so far to resemble Leghorn bonnets that they are made not of split but of entire straw; and the pattern of the plait, and mode of knitting the edges of the plat together, are the same.

In 1825* the Society gave the following rewards for Bonnets and Hats, made of British material, plaited and knit in imitation of those imported from Leghorn.

For articles made of indigenous grass, chiefly the crested dogs'-tail.

To Sophia Dyer, of West Meon, near Alton, Hants; two guineas.

To Anne Dyer, ditto; two guineas.

To Mrs. Venn, of Hadleigh, Suffolk; nine guineas.

To Anne Venn, ditto; three guineas.

To Lucy Hollowell, of Banbury; five guineas.

To the children of Mrs. Villebois' school at Adbury, Berks; five guineas.

To Mary Marshall, mistress of Lady H. Bernard's school, at Bandon, near Cork; two guineas.

To the children of the school at Bandon; three guineas.

For articles made of spring wheat.

To Mr. James Cobbing, of Bury St. Edmonds; fourteen guineas.

To Maria Pain, of Boxted, near Bury St. Edmonds; two guineas.

To Mrs. Morrice, of Great Brickhill, Berks; the Silver Ceres medal.

To Mr. James Long, master of the house of industry, at Barham, Suffolk; the Silver Ceres medal.

To Mrs. Syrett, of Bury St. Edmonds; ten pounds.

The transactions state that the specimens produced "are mostly superior to those for which rewards were bestowed in the year before: they exhibit considerable dexterity and accuracy, both in the plaiting and knitting, and some of those which are made of the straw of spring wheat may be mistaken, by ordinary observers, for real Leghorn of average quality. The crested dog's tail, the best probably for this purpose of our indigenous grasses, through of good colour, appears to be deficient in strength and elasticity; but the spring wheat (which is, indeed, the very plant used in Tuscany) appears, under proper

* Trans., Vol. xl., p. 217. † Trans., Vol. xli., p. 98. ‡ Trans., Vol. xli., p. 98.

* Trans., Vol. xliii., p. 80.

management, and in a suitable soil, to produce straw every way fit for the purpose."

In the same year the Society gave its Silver Ceres Medal to Mrs. Lowrey, of Exeter, for a bonnet made of doubled wheat straw.*

Mr. P. L. SIMMONDS said, the Society and the public generally were greatly indebted to Mr. Tansley for having prepared and laid before them with so much method and care an historical summary of the rise and progress of a very important home trade and manufacture, of which little was previously known—certainly nothing, calculated to convey any idea of the extent, the capital embarked, and value of the product. Although in the mere popular view of the subject it might—in its various details, and glancing at the numerous specimens exhibited —be considered more interesting to ladies, who were the principal purchasers and wearers of bonnets, yet it was not without general interest to the male sex, who sometimes wore straw-hats in boating, cricketing, &c., and were also interested in it as relating to home and export trade. It was much to be wished that a little more boldness was manifested by men, in wearing, at suitable seasons, a lighter covering for the head than the silk, felt, and cloth hats usually worn. Such a practice, while helping on an important home manufacture, would likewise, he thought, conduce to the preservation of the hair and lessen the number of bald heads. The due ventilation of the head and the more free exposure of the hair greatly conduced to its healthy preservation among the ladies. Our ever changing fashions and variable climate had much to do with the progress and prosperity of the straw plait manufacture. Looking at the strong contrasts in fashions, and the recurrence from time to time to old and obsolete styles of articles of dress, it was by no means improbable that the cottage bonnets, and milk-maid and gipsy hats worn half a century or more ago, which Mr. Tansley had pointed to as such curiosities, might, after all, be again seen in the shops and on ladies' heads. The subject of the working-up of grasses and plait of various kinds into coverings for the head, ornaments, matting, and fancy work, was not of interest alone to ourselves. The details and information connected therewith, hitherto of the most meagre character, were of great importance to numbers in Europe and America, as well as in Asia and our colonies. Some of their manufactures came occasionally into trade here, and several were of a most expensive character, realising exceedingly high prices. Such, for instance, as the fine Panama hats, so common an article of wear in Central America, the Southern States, and the West Indies. The sinnet hats, plaited by seamen, were made from the fronds of a species of palm; the cabbage-tree hats of Australia were from another palm, so were those made in Brazil, and the palmetto hats of the United States. In the Philippines hats were made of a very fine kind of rush, and formed of two hats, one within the other. At Ningpo, China, straw hats were made to a large extent, for he noticed that as many as 40,000 were sent annually to Shanghai from thence. Indeed, every country had its peculiar light hats in use, and most of them made of indigenous fibres. He would glance at the particulars of some few of these, which were of interest by way of comparison with our own growing trade and manufacture in straw plait. Florence long enjoyed a monopoly in straw work for hats and bonnets of great fineness and remarkable beauty, insomuch that bonnets had been made there that sold for as much as £70. The Swiss hats were made in Venetian Lombardy, and, if less fine than those of Florence, were at least cheaper. The straw plait industry was of great importance in Tuscany, occupying about 35,000 workpeople. The attempts made in other countries to produce the peculiar kind of straw used had hitherto entirely failed. The seed from which the straw for plaiting was grown was a small round grain of wheat, called *Grano marzolano.* It was an error to suppose that hats were made from rye or any other grass in Tuscany. This marzolano straw was cultivated for the sole purpose of being made into hats, and was grown chiefly in the vicinity of Florence, and on the hills on both sides of the valley of the Arno. Tuscan women had settled themselves in various places, such as Vienna, St. Petersburg, &c., where they carried on the manufacture with straw grown in Tuscany. Fine plait was not accounted good unless very much drawn together, for which end it was worked very wet. After being soaked and pressed, the plait was made up into hats by women who did nothing else; it was put together by the edges, not overlapped. On the operation of pressing a great deal depended. From a late consular return, he found that in the period of five years, from 1851 to 1855 inclusive, the exportation of straw work from Tuscany had progressively increased, as follows:—

1851	£9,832,292
1852	12,628.490
1853	16,772,314
1854	13,213.756
1855	23,186.820
Total	75,633.672

The diminution observable in the returns for the year 1854 was not real. The crop of straw was most abundant in that year, and the quantity of straw-work manufactured, very considerable; but a great part was exported in the following year. The value of straw-work exported, classed under different heads, gave the following results:—

	Hats.	Plaits.	Straw.
	£	£	£
1851	5,204,093	3,804,600	138,471
1852	7,875,475	4,064,604	335,331
1853	10,811,865	5,183,352	199.898
1854	6,956,620	5,278,824	95.012
1855	15,834,507	7,158,060	30,553
Total ...	46,682,560	25,489,440	799,265

It was clearly proved by this table, that the greater part of the straw was manufactured into plaits in Tuscany, and the popular belief that the liberty to export straw would ruin the native industry was shown to be unfounded. The value of straw-work exported during the above period constituted 28½ per cent. of the whole exportation of Tuscany. In the Duchy of Baden, considerable attention was given to the manufacture of straw hats. Those, particularly, from the districts of Neustadt, Freiburg, and Schönau, feared no competition save that of Italy. The superiority of these districts of the Black Forest was due, first, to the excellent quality of the straw, and, secondly, to the numerous schools which the government had carefully established there for teaching this particular branch of trade. It was worthy of remark that, in the Wurtemberg part of the Black Forest adjoining these districts, the straw did not possess those qualities which distinguished that grown on its southern side. It was clearly, then, the climate which here favoured the Grand Duchy. This industry was a most popular one; and everywhere in the forest the women might be seen twisting, in their agile fingers, the plaits of straw destined to adorn the pretty heads of their fair countrywomen of the towns. In Switzerland again, upwards of 70,000 persons were employed on straw plaiting and hats. The canton of Fribourg exported goods to the value of £60,000 or £70,000, and that of Argovie more than half a million sterling. France had a large trade, principally for local use, in straw hats and bonnets, at wholesale prices, ranging from 4*s.* to 15*s.* per dozen. At the Paris Exhibition of 1855, where

* Vol. xliii., p. 82.

there was an excellent display of straw plait manufactures of Tuscany, Switzerland, Belgium, Saxony, and France, Great Britain in this class was quite unrepresented, although, as the Jury Reports observed, "She occupies a distinguished rank" in this particular manufacture. A very creditable competitive display of our skill and industry was made at Hyde Park in 1851, and, judging from the specimens on the table, and the details given of progress, there was reason to believe that a better display still would be made in the Exhibition of 1862. Mr. Tansley had given the value and particulars of our home trade in this matter, and by way of comparison, and in order to fill up the details he (Mr. Simmonds would hand in for publication and reference, the statistics of the import and export of straw plait, &c., for the five years ending with 1858, the latest returns published. From these it would be seen that our import from France and Tuscany had declined nearly one-half, while our export averaged more than £43,000 in value, evidencing the activity of the trade, which even supplied foreign markets, besides the increasing consumption at home. Mr. Tansley's paper would, he felt sure, be read and studied with interest by large classes both at home and abroad, and it was a striking evidence of the great importance of very many seemingly small manufactures of the country which only required to be properly described to become much more appreciated.

General Imports.

	1854.	1855.	1856.	1557.	1858.
Plaiting of straw chip or other material, lb.	207,755	135 864	155,524	203.128	172,333
Cordon net..........lbs.	18,057	6,310	7,292	6,834	4,177
Plaiting of chip less in value than 6d. the piece of 60 yds.. lbs.	9,850	9,219	10,409	3,969	4,044
Willow squares.. cwts.	200	287	218	219	242
Hats and bonnets of straw, &c.........lbs.	...	37,901	36,852	67,454	35,272
Straw or grass for plaiting ....cwts.	...	478	504	165	84

Computed Total Value of the Imports into the United Kingdom.

	Plaiting.	Hats and Bonnets.
1854	£209,454	£168,543
1855	146,850	81,464
1856	158,023	86,155
1857	154,599	124,300
1858	156,369	93,588

The duty on imports was, from 1853, 2s. 6d. per lb. on hats or bonnets of straw; 2s. per lb. on plaiting, and 6d. per lb. on inferior chip; while willow squares paid 10s. per cwt., and formerly paid as much as 20s. a pound.

Quantities and values of Straw Plaiting and Hats imported from France and Tuscany.

	France.		Tuscany.	
	Quantity. lbs.	£	Quantity. lbs.	£
1854 ...Hats.	37,399	112,197	5,940	17,820
,, ...Plait.	176,926	171,766	20,856	20,248
1855 ...Hats.	14,699	44,098	7,078	21,283
,, ...Plait.	125,425	120,757	3,007	3,007
1856 ...Hats.	19,354	58,062	4,519	13,558
,, ...Plait.	148,220	137,830	4,745	4,745
1857 ...Hats.	24,953	74,860	2,983	8,948
,, ...Plait.	144,398	136.418	4,853	4,853
1858 ...Hats.	1[illegible],147	34,616	2,991	8,434
,, ...Plait.	110,994	105,785	12,569	12,569

Exports of Plaiting of Straw.

	Weight.	Val. of British	Val. of Foreign	Total.
	lbs.	£	£	£
1854 ..	138,713	40,515	17,472	57,987
1855 ...	101,831	41,145	10,280	51,425
1856 ...	112,285	58,972	7,306	66,277
1857 ...	126,968	46,804	25,455	72,259
1858 ...	82,114	29,810	20,507	50,317
Total...	561.911	217,246	81,020	298,265
Average	112,382	43,449	16,204	59,653

Straw hats were not particularly specified in the exports.

The Chairman said, in rising to perform the very agreeable task of proposing, "That the thanks of the meeting be given to Mr. Tansley for the large amount of information he had laid before them on this subject," he would offer one or two remarks. He believed they might fairly congratulate themselves upon having successfully established a trade in this country in opposition to the rivalry of Florence; and, connecting this subject with the one they had before them at the last meeting, it was gratifying to feel that hereafter their competition with Italy would be of a friendly and commercial character. Englishmen would be glad to see the commerce of Italy flourishing as successfully as their own. It was one of the great merits of this Society that it formed itself into a rallying point for the collection of great masses of information upon various subjects. Some of them, like the one before them that evening, might, at first sight, appear of small importance; but in reality, as had been evidenced by Mr. Tansley's able paper, they embraced large interests and exercised an important influence. Though he was himself, in some degree, interested in this article of commerce, he confessed he had not been previously aware of the extent to which this branch of trade had been carried, the number of persons employed in it, or the amount of capital embarked. It was not only an interesting but a curious branch of industry. It afforded, as they had heard, and as they saw by the specimens before them, great opportunities for the display of intelligence and good taste both in the shapes given to the various articles and in the material and the mode of manipulation. Upon an examination of the instruments used in the manufacture, he was sure they would be struck with the talent and ingenuity therein displayed. He gathered from the reading of the paper that wheat straw was now the material principally used in this manufacture. Some friend of his had made experiments in the preparation of grasses in the Orkney Islands with a view of superseding wheat straw and producing a cheaper article, but without success, for it must be remembered that the use of wheat straw enabled the farmer to secure two harvests, one of grain and the other of straw. There was a most useful Association, which he believed the author of the paper had mainly contributed to establish, for promoting honest dealings in the article of plait. In this case as in a great many others, great frauds had been practised, both as to the quantity and quality of the article, and it was very essential that in a place like Luton, where the manufacture was for the most part in the hands of the poorer classes, the lesson of integrity in dealing should be taught. An association was therefore formed and rules were established on the subject of measurement, which afforded an equal amount of protection to the producer and the purchaser. It was an agreeable reflection that so large a number of the poorer classes found in this branch of trade the means of obtaining an honest livelihood. His only fear was that children might be introduced into it at too early an age. Mr. Tansley had mentioned the age of four years, but he believed that remark only applied to the school children, where the objection did not so strongly apply. He thought an expression of feeling on the part of the Society against the too early employment of children would have ome

weight if it were communicated to the districts where this manufacture was for the most part carried on. He would take this opportunity of expressing his personal obligations to Mr. Tansley for having brought this interesting subject before them, and he was sure the meeting at large would join in thanking him for his paper.

Mr. Robert How, as a native of Luton, could not allow this proposition to be put without personally tendering his thanks to his friend Mr. Tansley for so ably introducing this subject, and for bringing under their notice the many beautiful specimens of a manufacture in which he was interested. Mr. Tansley had told them that it afforded employment to many thousands of people. Any person visiting Luton would be impressed with the importance and extent of this manufacture. It was in former years described as a "village," afterwards as a "little dirty town" in Bedfordshire. It was now, he believed, one of the largest towns in the neighbourhood of London. He did not think there was a town within the same distance of London which had a larger population than Luton, and he believed it would compare favourably with any other for order, cleanliness, and morality. He looked upon this manufacture as one of the growing industries of the country. The trade had lately been much depressed, owing to the wetness of the last season; but he hoped, in the next season, under the patronage of our fair countrywomen, extended towards an article of home growth and home manufacture, a great improvement would take place in this branch of industry, and that straw plait articles would be more extensively introduced.

Sir Thomas Phillips (chairman of the Council) said he might be allowed to do something more than offer a silent acquiescence in the expression of their thanks to Mr. Tansley for his very interesting paper; and he could not help thinking that the labour Mr. Tansley had bestowed in the collection of the numerous and very beautiful specimens of straw plaiting, entitled that gentleman to their best acknowledgments. He hoped the ladies present would not simply admire those specimens of the straw plait of Luton and Dunstable, but that they would more largely extend their patronage to a manufacture which contributed so much to their personal adornment as well as to the livelihood of so large a number of the poorer classes. He could not help thinking it was an interesting subject of contemplation that from 80,000 to 100,000 people were employed in comfort, cleanliness, and moral habits in what might truly be called home occupation. They were all naturally proud of the great development of our manufacturing system; but they might at the same time be proud that some small remnant was left of employment of a not unimportant character for the poorer classes at their own homes. They had been told that this production was brought into the market to the value of a million and a quarter annually, and while it had contributed in a subtantial manner to the national necessities, it contributed also o the comfort, respectability and intelligent improvement of those who were engaged in that manufacture. It was a branch of industry which called for the exercise of intelligence in a marked degree. It was obviously of no small importance and interest that the protective duties which straw plait enjoyed up to within the last fifteen years had been removed without injury to to the home manufacture, while opening a fair amount of competition to foreign producers. He remembered that the late Sir Robert Peel, in 1844 or 1846, when he introduced the change in the Customs arrangements, produced in the House of Commons a small bundle of straw for the purpose of showing that it was impossible to protect themselves against the arts of the smuggler, inasmuch as in bundles which apparently were of straw there was concealed a certain quantity of plait, so as to evade the duty, and fraud was thus practised on the revenue. He begged to express the gratification which this paper had afforded him, and he was quite sure the meeting would heartily concur in the expression of their best thanks to Mr. Tansley for the great pains he had bestowed upon his subject.

The vote of thanks having been passed,

Mr. Tansley said it had afforded him great gratification to prepare this paper, and to bring before their notice the straw manufacture of the country in all its various branches; and since they had been so kind as to express themselves so favourably towards himself, he felt it his duty to state that the numerous specimens before them had been furnished by the leading firms in the straw trade; therefore, to them the praise was due, as well as to himself. He hoped the ladies present would bear in mind the fact that from 70,000 to 80,000 of their own sex were employed in this branch of manufacture, and therefore, by their patronage of it, they would contribute to the moral and social well-being of a very large class of society. When ladies wore straw bonnets they patronised a strictly national article, as they were entirely of home produce, both as to the material and the manufacture; and, happily, it was a portion of female attire which became the ladies of this country better than anything else they could wear. Some remarks had been offered as to the wearing of straw hats by the male sex. He was certain, if the gentlemen of London had the boldness to wear them, they would experience great comfort from them in the hot season, both as to convenience and the preservation of the hair, which suffered considerably from the want of proper ventilation in the hats now generally worn. He had, however, no wish to prejudice the trade of the silk hat manufacturers. The recent improvements that had been introduced, both in the material of plait and the colours, would tend, he believed, to extend the trade very much; and they could not but rejoice at the progress of so important a branch of native industry, and heartily wish it success.

The paper was illustrated by specimens of the various kinds of plaits, and of articles made from them.

The Secretary announced that the next ordinary meeting would be held on Wednesday evening, the 16th January, when a Paper by Dr. Edward Smith, F.R.S., "On Recent Experimental Researches on the nature and action of Alcohols as Food," would be read.

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS.

Chili Coal.—The coal mines of Talcahuano, situated at the ports of Lota and Coronel, both in the bay of Arauco, have been worked since 1851. The quantity of coal raised at Lota in 1854 was about 300 tons per week; the quantity of screened coal raised at Coronel at the same date was about 1,000 tons per week. The coal has been used for some time with great advantage on board the Pacific Steam Navigation Company's steam ship *Nueva Grenada*, the master of which reports greatly in its favour. It produces a good deal of smoke, and requires some management. Its heating qualities are considerable, and it is preferred on this account for the use of steamers to English and Welsh coals. Some questions have been raised as to the effect produced on this coal by exposure to air in hot climates, the impression being that it would not maintain its solid condition. It has been alleged that this coal, from the amount of sulphur it contains, would be peculiarly liable to spontaneous combustion, but there does not appear to be any foundation for this impression.

Sugar.—Swatow is the greatest sugar-producing district in China.

Camphor.—Considerable and advantageous exports of camphor may be carried on at Amoy. The easy access to

and from Formosa renders it the natural store-house of all the produce of that fertile island.

Silk Goods.—Fuh-shan, or Fat-shan, a town about twelve miles west of Canton, is the principal seat of the manufacture of silk piece-goods in China.

Chili.—The Government of Chili in 1854 granted an exclusive privilege for the navigation of the river Bio-Bio by steam, and a boat suited for this purpose, drawing only sixteen inches of water, was obtained from California.

Lubeck.—This quaint old Hanseatic city shows unmistakable signs of increasing prosperity, and since Christmas, 1854, it has been lighted with gas.

Cocoa-nut Oil is now being produced in great abundance in the Navigation Islands.

Floor Cloth.—The manufacture of waxed or oil cloth is a flourishing business in Leipzig; and the designs for floorings, table covers, &c., have much improved of late years.

Rape-Seed Oil.—A new kind of grease, made from this oil, is now manufactured at Leipzig. The mass of grease or fat is quite pure, without taste or smell; and, according to medical certificates, contains nothing in the least injurious to health. In cookery, it answers fully the purpose of butter, with the advantage that instead of the usual quantity of butter, one-third in quantity of the rapeseed grease will suffice.

Iron Ore.—The discovery of a considerable field of iron ore at Hof, on the Bavarian-Saxon frontier, gave rise in 1854 to an association for carrying on extensive iron works there, which are to be worked with coals brought from Zurckau. The yield of iron from the ore is estimated at 35 per cent. A railway direct from Zurckau to Hof for the transport of coal would, it is said, give complete success to the undertaking.

Sherboro' Island, on the western coast of Africa, exports palm oil, palm nuts, rice, camwood, ground nuts, bennie seed, in small quantities, country cloths, ivory, coarse mats, and timber. The production of palm oil, palm nut kernels, ground nuts, and rice is said to be capable of increase to almost any extent, being solely dependent on the peaceful condition of the country.

Cotton Tariff, Bilboa, Spain.—The importation of cotton goods is limited to those of twenty-six threads to the quarter of the Spanish inch. This has a most injurious effect, as well on the Spanish exchequer as on the just and honourable trader, by the large contraband trade such restrictions naturally give rise to. This contraband trade appears to have assumed a most systematic form, insurances being, it is stated, regularly effected to cover the risk of seizure. Cotton shirtings are charged a duty at the rate of nearly 39 per cent., whilst printed cotton handkerchiefs pay a duty amounting to upwards of 48 per cent. The duties on velveteens and fustians, articles of large consumption, are most excessive, being on velveteens upwards of 75 per cent. In addition to the above duties, there is an average differential duty of 20 per cent. Duties of from 30 to 40 per cent. are demanded upon such descriptions of linen (chiefly Irish) as are allowed to be imported, and on linen yarns the duties vary from 8 to 30 per cent.

Woollen and Stuff Goods, of a coarse character, were formerly exported to a considerable extent into the Basque provinces, and notwithstanding the excessive duty, in some instances amounting to nearly 120 per cent., they are still in demand, and being too bulky an article for smuggling, moderate importations are still made. The finest descriptions of woollen goods are almost wholly imported from Great Britain and France, the duties varying from 40 to 80 per cent.

Iron Ore abounds in the mountains surrounding Bilbao, and gives considerable employment to native industry, and is exported to a large extent to France. This branch of industry commenced in 1850, and was prospering materially, English vessels being employed to convey cargoes of the ore to England. In March 1852, however, the Spanish Government imposed an export duty on this article, and a differential duty on such of it as was carried in English bottoms, and at once stoppped the trade with England.—The ore in question is used in the iron manufactures of Biscay, and to a large extent in an iron foundry adjoining Bilbao.

Copper.—Ore is found in the province of Biscay (Spain) and mines of it are now worked, the ore being shipped to Swansea for smelting.

Weights and Measures.—A new system of weights and measures, published by the King of Sweden, came into operation on the 1st January, 1856. His Majesty has, however, made it optional with the sellers and buyers to make use of the old or new weights and measures until the 1st January 1863, after which time the new weights and measures are alone to be used.

Agriculture in Sweden is in a defective state. It is stated that there are 400,000 acres of unimproved land capable of being cultivated. The peasant farmers of the country require to be taught that it is their interest to make use of horses instead of oxen for agricultural labour—that they must drain their land and make available all modern improvements before Sweden (by these means doubling her produce) can afford to become an exporting country.

The Use of Brandy.—A curious fact prevails in Sweden in connection with the use of brandy:—A male criminal is condemned, for some crime, to lose his head; on the way to the place of execution he is allowed to stop at a certain public-house where brandy is sold, and he is supplied with a glass of what—to the last—is esteemed by him a great consolation, and what, in all human probability, has paved his way to the block.

Illicit Distillation of Brandy in Sweden goes on to an alarming height, and smuggling from other countries is very prevalent. To put to end to these evils would be most difficult, owing to the nature of the coast and the interminable forests of the country.

Annam, or Cochin China.—The trade with Annam is similar to that of Siam as regards the nature of the products exchanged, sugar, salt, oil, rice, raw silk, and other sundries being the imports received into Singapore in return for opium, piece goods, lead, Spanish dollars, &c., sent from thence. At one time the King of Annam, like the sovereign of Siam, possessed a number of square-rigged vessels, with which he traded to Singapore, whilst he admitted into his ports the ships of all nations, several of which have taken in cargoes direct for Europe. But the unfortunate collisions which the Cochin Chinese have encountered with Western Powers, first, in 1845, when a fortification was battered down by the United States frigate *Constitution*, and secondly, in 1847, when the French frigates *La Gloire* and *La Victorieuse* destroyed in Turon bay the king's fleet of ships, appear to have increased to a high degree of animosity the unfavourable prejudices they had previously conceived against foreigners, and have led to the prohibition of all intercourse with western nations, so that no square-rigged ship of Cochin China is now seen at Singapore, nor are foreign vessels allowed to traffic in Cochin Chinese ports.

Dunkirk.—The articles exported to England from Dunkirk consist chiefly of silks, linseed cakes, wines, fresh fruit, sowing seeds, refuse of wool, animal charcoal and haberdashery.

Nitrate of Soda.—Iquique, in the province of Tarapaca (Peru) in the department of Moquegua, is a small but growing town, meanly built on a sandy plain at the foot of the coast range of hills, which rise here from 3,000 to 3,500 feet. The harbour is safe and commodious, and is protected by the island of Iquique (latitude 20 deg. 13 min. 15 sec. S., longitude 70 deg. 13 min. W.) from the

swell which occasionally sets in during the winter season from the south-west. At Tampaca, the chief town of the province, about 30 leagues distant, resides the sub-prefect. In Iquique are a governor, captain of the Port, Custom-house officials, and two Jueces de Paz; there is only one Consular agent, that of Hamburgh, which is at times a source of much annoyance, as in case of any disputes between shipmasters and their crews the vessels have to proceed to some other port where there is a consul.

The steamers of the Pacific Steam Navigation Company call four times monthly; on the 1st and 17th on their way from Panama to Valparaiso, and on the 4th and 19th on their return,

Their tonnage amounts to 15,000 tons annually.

Iquique is the centre of the nitrate of soda trade, and to this article alone it owes its present position. The population of the province is estimated at 15,000, four-fifths of whom are more or less interested in it.

Large and apparently inexhaustible beds of nitrate of soda and other salts are found in the pampa or plain of Iamarugal, say between the Valley of Camarones on the north, and the river Lox (the boundary line of Peru and Bolivia) on the south, a distance of over 150 miles, lying principally towards the western side, distant from the shipping port from 6 to 12 leagues. The beds of nitrate, or calisheras, are insulated deposits, very irregular, some on the plain, others on the rising ground, varying much in size and shape, and in depth beneath the surface crust of earth and clay, from one inch to many feet, and in thickness from six inches to as many feet. Amongst the other salts found in their vicinity may be enumerated carbonate and sulphate of soda, biborates of lime and soda, magnesian-alum, chlorate of sodium. Traces of iodine exist in the nitrate, and in most of the waters in the plain have been discovered traces of boracic acid.

The system pursued by the salibreros, or makers of nitrate, in its extraction, is very rude (in face of many and expensive experiments to improve it, which have hitherto almost proved useless) and shows but little alteration since the trade was commenced in 1830. The barratero makes a large hole in the ground, and fills it up with a coarse gunpowder made on the spot, sometimes to the extent of 300lbs. blasts, and the quantity thrown out is broken, and the earthy crust separated from it. A carrier with his donkeys then takes it to the works, where it is broken into smaller pieces and the coarser parts separated. That which is chosen is thrown into a large pan into which water has been put, and a fire kindled beneath; it is continually kept in motion by stirring, the stirrer throwing out the earthy or insoluble parts; after boiling from 2 to 4 hours, some mother water is then thrown in; after this it is baled out into a deposit, where it deposits all the earthy particles, and from thence it is removed to shallow coolers where it crystallises.

Its cost at the works varies from $6\frac{1}{4}$ reales to $8\frac{1}{4}$ reales per quintal, according to the aptitude of the labourers, and the distance they may have to send for water and fuel. The rate of carriage to the coast also varies from $5\frac{1}{2}$ to $7\frac{1}{2}$ reales per quintal.

The average rate now paid for nitrate placed on the beach is 14 reales, and this would give the makers $\frac{3}{4}$ reale per quintal profit. Nitrate of soda is always sold deliverable alongside the ship's launch outside the surf. The merchant has to bag and embark it, which costs him about $1\frac{3}{4}$ reales per quintal, therefore selling at 17 reales would yield him $1\frac{1}{4}$ per quintal profit.

A new system, for which a Mr. Gamboni has obtained a privilege, is now being introduced by Mr. Peter King and others; its merits are—saving of fuel and labour, and a greater amount per cent. of nitrate produced.

The caleche is put into an inverted semicone, and a jet of steam is introduced through a perforated bottom, a liquid shortly flows which is received in a canal, and at once conveys itself to the coolers.

The wages now given are to the barratero (miner), and fondeador (boiler of the nitrate), 1 real per quintal of th nitrate produced each; to the acendrador (who breaks the nitrate and separates the refuse) $\frac{1}{2}$ real per 2 quintals; to other labourers, 1 dol. 4. to 2 dols. per day.

The principal shipping places are Iquique, Patillos, Mexillones, and Pisagua. The total amount exported to all countries between the years 1830 (when the trade was commenced) and 1854 was 8,036,108 quintals.

INDUSTRIAL SOCIETY OF MULHOUSE, FRANCE.

The following is a list of the prizes offered for public competition (open to all Nations) by this Society, and which are to be awarded at its general meeting in May, 1861. The papers are to be sent in before the 15th February, 1861.*

Emile Dollfus' Prize (to be awarded in May, 1869.)

For such a discovery, invention, or application, made during the ten preceding years, as shall be deemed by the said Society to have been the most useful in one of the great branches of industry carried on in the Department of the Upper Rhine.

Chemical Arts.

1. For a theory of the manufacture of Adrianople red —*Silver medal.*
2. For a useful process for calico printing—£100. *or gold, silver, or bronze medal.*
3. For a metallic alloy suitable for making scrapers of rollers (doctors)—*Gold medal.*
4. For providing the manufactories of the Upper Rhine with 2,000 kilog. [about 2,400lbs.] at least, or the equivalent quantity in powder, of madder-root, grown in the same year in a single property in Algeria; or for half of said quantity, under the same conditions—*Gold medal and silver medal.*
5. For a practical means of ascertaining the adulteration of oils—*Silver medal.*
6. For an important improvement in bleaching wool. *Silver medal.*
7. For the best treatise on bleaching fabrics made of unbleached cotton.—*Silver medal.*
8. For a table of the chemical proportions of organic colouring matters—*Silver medal.*
9. For a treatise on the natural organic mordants of wool, silk, cotton, &c.—*Silver medal.*
10. For a means of rendering murexide reds less liable to alteration when exposed to sulphurous vapours—*Gold medal.*
11. For a treatise on the manufacture of extracts of dye-woods—*Bronze medal.*
12. For a considerable improvement in engraving rollers—*Silver medal.*
13. For the best system of vats for dyeing and washing —*Silver medal.*
14. For the manufacture of an ultramarine which is not liable to alteration when thickened with albumen and fixed by steam in the ordinary manner—*Silver medal.*
15. For the theory of the cotton unsuitable for colouring, known under the name of dead cotton—*Silver medal.*
16. For the discovery or oxynaphthalic acid, or for a preparation of chloroxynaphthalic acids, or for a treatise on the application of Laurent's colours to dyeing and to calico printing—*Gold medal.*
17. For a process of dyeing or calico printing by means of alkaloids—*Gold medal.*
18. For a metallic red colour, or metallic deep green, or metallic violet colour, which may be used in cylinder printing with albumen—*Gold medal.*

* Detailed programmes may be obtained of the Industrial Society, Mulhouse, and a copy of the French original may be seen at the House of the Society of Arts, John-street, Adelphi.

19. For introducing hydroferrocyanic acid or ferrocyanides of calcium or barium into commerce—*Silver medal.*

20. For preparing dark madder lake by means of iron and alumina—*Silver medal.*

21. For the best practical manuals—1st on engraving printing rollers; 2nd on engraving plates for printing; 3rd on bleaching tissues of cotton, wool, wool and cotton, silk, hemp, and flax (according to the merit of the work)—*Gold, silver, or bronze medal.*

22. For the best treatise on catechu—*Silver medal.*

23. For the employment on a large scale of ozone in calico printing—*Silver medal.*

24. For a substance for thickening colours, and sizes, whereby a saving of at least 25 per cent. is obtained—£200.

25. For a treatise on the action of ammonia upon colouring matters—*Silver medal.*

26. For a work on aniline red, aniline blue, and the secondary products of aniline violet—*Gold medal.*

27. For a treatise on the best mode of obtaining benzine in distilling fuel—*Silver medal.*

28. For a means of fixing coal-grey colours otherwise and better than by albumen—*Silver medal.*

29. For a treatise indicating how molecular substitutions affect organic coloured compounds—*Silver medal.*

30. For an analysis of the Lokao, or China-green—*Bronze medal.*

31. For applying the action of light or electricity on colouring substances, or on substances colouring by those agents, to calico printing—*Gold medal.*

32. For a new and practical application of light or electricity to calico printing—*Gold medal.*

33. For a substance superseding in every respect the dry albumen of eggs in calico printing, and whereby a saving of 25 per cent. is obtained on the price of albumen. The albumen of blood, if thoroughly decolourised, will be admitted to competition—£700 *and gold medal.*

34. For introducing alizarine into commerce—*Gold medal.*

35. For a treatise on the possibility of reproducing indigo from its sulphuric compounds—*Bronze medal.*

36. For separating the white of eggs from the yolks when mixed together—*Gold medal.*

37. For a treatise on the degrees of dampness and heat that are most suitable for the quick decomposition of acetate mordants—*Silver medal.*

38. For a treatise on the chemical composition of the fire-bricks used in Alsatia—*Silver medal.*

39. For a new source of aniline other than nitrobenzide—*Silver medal.*

40. For a treatise on the use of resins in bleaching calico—*Silver medal.*

41. For a new use for the yolks of eggs—*Gold medal.*

42. For a starch for sizing well the fag-ends of pieces of calico—*Silver medal and* £40.

Machinery.

1. For a treatise on spinning cotton, Nos. 80 to 200 (metrical system)—*Gold medal.*

2. For the manufacture and sale of new textile fabrics in the Department of the Upper Rhine—*Silver medal.*

3. For the best essay on the purification of the different kind of oils suitable for lubricating machinery—*Gold medal worth* £20.

4. For an improved construction of cards for carding cotton—*Silver medal.*

5. For a treatise on the movement and cooling of steam in large pipes—*Silver medal.*

6. For a complete treatise on the transmission of movement—*Gold medal.*

7. For detailed plans and a complete description of all machines used for spinning combed wool according to the best-known systems—*Silver medal.*

8. For a rotatory steam-engine—*Gold medal worth* £40.

9. For the invention and application of a machine, or series of machines, for preparing long-stapled cotton for combing with greater advantage than by the known processes—*Gold medal worth* £80.

10. For the invention and application of a machine, or a series of machines, for opening and cleaning short-stapled cotton, and preparing the same for carding, purifying, combing, &c.—*Gold medal worth* £40.

11. For the invention and application of a combing machine, or a series of combing machines, for short-stapled cotton, which, like Heilmann's combing machine, may be advantageously substituted for the ordinary carding, batting or scutching, and blowing machinery—*Gold medal worth* £40.

12. For a treatise on the construction of buildings and the arrangement of machines for cotton spinning or power-loom weaving—*Gold medal.*

13. For the best arrangements to be adopted in the manufactories of the Upper Rhine for the purpose of preventing accidents—*Gold medal.*

14. For a new washing or scouring machine—*Gold medal.*

15. For a treatise on heating manufactories, and particularly cotton mills, by steam—*Silver medal.*

16. For a more economical mode of packing thread (of gold or silver) on bobbins or in cans than that usually adopted—*Silver medal.*

17. For a complete project of stopping the water of any stream of the Upper Rhine, for the purpose of preventing inundations, and forming a reservoir for agricultural and industrial purposes—*Gold medal worth* £40.

18. For the invention and application of a steam meter—*Gold medal.*

19. For the invention and application of a water meter applicable to steam generators—*Gold medal worth* £60.

20. For a means of ascertaining the amount of water carried off with the steam from steam boilers—*Gold medal.*

21. For a pump or other apparatus to be employed in bleach works for filling vats with the solutions of acids used in bleaching fabrics—*Silver medal.*

22. For a treatise on the motive-power necessary for working the different machines of a cotton mill or power-loom factory—*Gold medal.*

23. For the best essays, under the form of manuals, on the following subjects, and chiefly intended for the use of foremen, overlookers, or workmen; viz., cotton spinning, spinning combed wool, cotton weaving, twisting cotton, wool, or silk; manufacture of paper; construction of machines (according to the respective merits of the works)—*Two gold medals, two silver medals, two bronze medals.*

24. For a treatise on the construction of ground floors for cotton mills and power-loom factories—*Gold medal.*

25. For the invention and application of a registering dynamometer—*Gold medal.*

26. For the invention and application in a manufactory of the Upper Rhine of an apparatus or contrivance for protecting workmen from accidents caused by machines or apparatus for transmitting power—*Silver medal.*

27. For plans and specifications of houses similar to those of the Mulhouse *cités ouvrières*, offering an economy of 20 per cent. on the cost price of those already constructed—£240.

28. For an improved construction of tubular boilers—*Gold medal.*

29. For an analysis of the gases issuing from the chimneys of boilers—*Gold medal.*

30. For the manufacture and sale in the department of the Upper Rhine of less costly bricks than those in present use—*Gold medal.*

31 For a process of separating the calcareous and other salts contained in the water of the Mulhouse wells, in reservoirs outside the boilers—*Gold medal and* £40.

32. For the most expert firemen of stationary engines—5 *Silver medals, and* £4, £2, or £1.

NATURAL HISTORY AND AGRICULTURE.

1. For a geognostic or mineralogical description of any part of the Department of the Upper Rhine—*Silver or bronze medal.*

2. For planting, in the districts of Mulhouse or Belfort, 4,000 to 1,000 hop plants—*Silver or bronze medal.*

3. For an analytical index of the plants of either the districts of Mulhouse or Belfort, or only of one or several cantons of those districts—*Silver or bronze medal.*

4. For a work on the Fauna of Alsatia—*Silver medal.*

5. For a work on the cellular cryptogameæ of the Upper Rhine—*Silver or bronze medal.*

MANUFACTURE OF PAPER.

1. For importing into France a filamentous substance in the state of half-stuff, which may be applied to the manufacture of paper—*Gold medal and a premium of* £160.

2. For the best treatise on decolorizing and bleaching rags—*Gold medal worth* £20.

3. For introducing into commerce 500 kils. [about 1,000 lbs.] at least of paper, having all the qualities required for photographic purposes—*Silver medal.*

VARIOUS PRIZES.

1. For an important improvement in any branch of industry of the Department—*Gold, silver, or bronze medal.*

2. For introducing a new branch of industry into the Department of the Upper Rhine, or for a treatise on those branches of industry which might be improved or established in said Department—*Gold, silver, or bronze medal.*

3. For having, before the 30th April, 1861, caused the discontinuance of the use of wood in at least 150 workmen's households, and the substitution therefor of the more economical use of coal—£40.

PATERA'S PROCESS FOR EXTRACTING SILVER FROM ITS ORES.

BY CLEMENT LE NEVE FOSTER.

The process in question was originally suggested by Dr. Percy, F.R.S., of the Government School of Mines, and has been of late years taken up and carried out on a large scale by one of the most celebrated metallurgical chemists in Austria, viz., Herr von Patera. This process is of special interest, on account of the analogy it presents with the well-known "fixing" in photography, which is nothing more than dissolving out the chloride of silver (which has not been acted on by light) by means of hyposulphite of soda.

In the metallurgical process this property is made use of in the following manner:—The ores which contain the silver in combination with sulphur, or with sulphur and arsenic, are roasted with green vitriol and common salt, and thus is produced a chloride of silver which may be dissolved out by a solution of hyposulphite. The silver can then be precipitated by sulphide of sodium, falling down as sulphide of silver. All that is necessary to be done then is to heat the sulphide in a muffle in contact with the atmosphere; the sulphur escapes in the form of sulphurous acid, and the silver remains in the metallic state. It is then melted in plumbago pots and cast into ingots for the mint. Such is a rough outline of the process which is now, and has been for some years, in operation at Joachimsthal, on the northern frontier of Bohemia. The ores which are subjected to this process are rich in silver, containing on an average two per cent., but often as much as 10 per cent. Ores containing less than one per cent. are melted down with pyrites in a cupola blast furnace for regulus or *matte*, which is then treated as the ore.

The advantages of this process are manifold, 1stly, Ores containing large amounts of arsenic can be thus successfully treated, when Ziervogel's process would fail. 2ndly. The expense of heating a strong solution of salt, as in Augustin's process, is got rid of, as the hypo-sulphite is used cold. 3rdly. The hypo-sulphite filters quicker and better than the brine in Augustin's process, for the dissolving power of hyposulphite being great, a weak solution may be used. 4thly. The solution of hyposulphite may be used over and over again, for it is being continually renewed, and as this is one of the peculiar points in the process, it deserves particular attention. The precipitation of the silver is effected, as has been before stated, by sulphide of sodium, and this is a polysulphide, for it is prepared by calcining soda with sulphur and then boiling it with sulphur. In this manner a polysulphide of sodium is formed, but in contact with the air some hyposulphite of soda is generated, and thus, each time that the silver is precipitated, some hyposulphite of soda is added to the solution. In this way Herr von Patera, who commenced with 14lbs. of hyposulphite of soda (and who yearly extracts more than 3,000lbs. of silver), has never needed a fresh supply, and has, in fact, been obliged to throw away quantities of solution, as his stock was always increasing. The expense of this process is not great; the extraction of a pound of silver from the ore costs, on an average, only 9s. 9d., whilst by the method of smelting formerly in use, the cost of production of a similar quantity of metal was no less than 16s.

OIL WELLS.

A new article of commerce from America seems likely soon to attract much attention. On the western border of New York State, at a place called Union Mills, some working men a year or two back observed a quantity of dark oily matter floating on pools abounding in that district. Subsequent experiments led to the discovery that the oil is highly adaptable for illuminating purposes, and that by sinking wells to the depth of from 70 to 500 feet it can readily be obtained throughout a very extensive area. Indeed, it is said already to have been ascertained to be dispersed over 100 square miles. The proportion of oil in the liquid pumped up is about one-third, and the process of separation is very simple. Land in the locality has become exceedingly valuable, and the business is rapidly increasing. About 1,200 to 1,500 barrels, containing 40 gallons each, are now, it is said, being raised daily and sent to New York, where, when rectified, it sells in any quantity at a price equal to 3s. sterling per gallon. There is a residuum, also, which is described as being used for the manufacture of superior candles. Many shipments of the oil have been made to Australia. In addition to its illuminating capacity it is alleged likewise to be suitable, when mixed with fish oil, for the process of lubrication.

AUSTRALIA.

The *Times* of the 18th instant states, that the news by the present steamer from Australia is in one respect the most important ever received. The problem as to the possibility of crossing the continent from South to North has been virtually solved, and no question now remains that a land transit may be opened up, available, not only for the general purposes of commerce, but also for telegraphic communication. Mr. Stuart, who started from Adelaide about last March on an exploring expedition, with two companions and a number of horses, has returned, after having crossed the country to a distance of about 1,600 miles from Adelaide and to within 300 miles of the Victoria river. Here he was turned back by a body of hostile natives; but, as he had already reached 100 miles further north than the point to which Gregory's expedition in 1856 descended from the Victoria, the continent may be considered, by the joint results of these surveys, to have been fairly opened up from one end to the other. Instead of an arid desert, it is described to be a practicable country throughout. The full details of the

observations made were for the present, however, kept secret, the Parliament of South Australia having voted £2,500 to enable Mr. Stuart to start again with a larger and more strongly organised party, and a desire being entertained to prevent the triumph of final success being snatched from him by rival explorers in the other colonies, who might hastily avail themselves of all his information. Still, enough had been allowed to transpire to give a general idea of the route traversed. Mr. Stuart and his companions suffered terribly from want, not only of water, but of food, and also from an attack of scurvy. The part of the route in which water was totally absent, however, was only 60 miles. In many parts there was fine grass, besides splendid gum and other trees, including at least four kinds of palm. A very large salt lake was also discovered in the interior, supposed, from the blueness of its water, to be of great depth. The event had created great excitement and rejoicing at Adelaide, and the general impression was that a number of new provinces would ultimately be formed in the territory thus explored, and that meanwhile the tract might be made available almost immediately to facilitate communication with India, and especially the export trade in horses. The new expedition, which was to start immediately, would consist of Mr. Stuart and one of his former companions, ten other well-armed men, and a suitable number of horses.

STEAM NAVIGATION ON CANALS.

It is stated that the Grand Junction Canal Company have brought into use steam power for canal navigation, which if successful will materially reduce the cost of conveyance. The peculiar feature in the steamboats employed to ply between London and Birmingham or Manchester is a form of screw propeller, invented by Mr. Burch, of Macclesfield. This "waggle tail" propeller is said to have the advantage of keeping all the disturbance of the water immediately behind the stern of the boat, instead of spreading it right and left, thus securing the canal banks from being damaged by the wash, and economising the motive power. On Tuesday last, the 18th inst., a party of gentlemen accompanied Mr. James Fulton, one of the company's officers, in a trip from the City Basin along the Regent's Canal to Paddington, a distance of five miles and three quarters, which was accomplished in an hour and a half, including the passage of five locks, and the Islington tunnel, half a mile long. The *Pioneer*, an ordinary fly-boat, 75 feet long by 7 feet extreme breadth, 25 tons burden, and drawing 2½ feet of water, with an engine of six-horse power, was the boat employed, towing another fly-boat which was laden with a general cargo to go to Wolverhampton. The two boats were able to go through the locks at once, floating side by side, and thus saving much delay. It is stated that the *Pioneer*, when tried at Manchester, proved able to draw six loaded barges at once, with a total burden of no less than 300 tons. Four miles an hour, allowing for the locks and other hindrances, it is estimated will be the average rate of steam performance, instead of two miles an hour, the usual speed obtained by horse-towing. The steamboat has stowage room for 2½ tons of coal, which will carry her from London to Birmingham and half-way back, superseding the expensive relays of horses and drivers requisite for so long a journey. This water locomotive is estimated to be nearly 30 per cent. cheaper than railway carriage.

It may be observed that the aggregate amount of canal traffic, instead of diminishing, has increased since the construction of railways, and is now 25,000 tons more than it previously was. The total length of canals now open in Great Britain is about 5,000 miles, including all the branch lines and junctions, and these works represent a capital of some forty millions.

Home Correspondence.

ELECTRO BLOCK PRINTING.

Sir,—I must apologise for taking up your valuable space in answering your correspondent Mr. William Stones; but as he has, through your *Journal*, questioned my right of patent, I must solicit your indulgence for a reply. Had he carefully read the discussion which followed, and particularly the remarks of Mr. Hanhart, he would have seen that the drum machine was fully alluded to and acknowledged by me as having been exhibited at the Paris Exhibition by Mons. Célérin; but, like Mr. J. Murdock's, it was totally behind the wants of the day, for while they printed *on to* a sheet of rubber, I print *from a* sheet of rubber, and am enabled to give any required number of impressions from the ordinary lithographic printing press. Mr. Stones' complaint reminds me of the Frenchman who, while boasting that his countryman had invented the shirt frill, was reminded by an Englishman that it was *his* countryman who had invented the shirt.

I am, &c.,
H. G. COLLINS.

COPYING PICTURES IN PUBLIC GALLERIES.

Sir,—A paragraph, headed "Artistic Copyright," in your *Journal* for December 7th, calls attention to the number of persons engaged in copying the pictures in our public galleries, and advocates its being put a stop to. The grounds on which this repressive measure is advocated are—that the copiers are not students—the copies are sold to dealers who resell them as originals—and that the copying of these pictures serves rather to injure than to promote Art.

Having had for many years both friends and acquaintance engaged in the galleries, I am enabled to form a pretty accurate opinion as to the motives they have in making copies, and am inclined to divide them thus:—

1. Artists whose business consists in copying for sale.
2. Students copying for improvement.
3. Artists desirous of copying a particular master, to keep as a memorandum.
4. Amateurs copying for amusement and improvement.

Of the first, many are engaged in making copies for private commissions (which can scarcely be considered objectionable), or for engravers' use; the latter involves a separate question altogether—viz., artists' copyright in public property. Of the copies made by classes 1 and 2, many are no doubt purchased by dealers, but as selling them as originals is punishable by an action at common law, there needs no fresh Act to stop it. Of the 3rd and 4th classes, few are ever sold.

When the Vernon Gallery was first offered to the public, a rule existed which permitted no copies to be taken. This regulation gave great dissatisfaction, and was subsequently rescinded.

I should be loth to see the Society of Arts countenance a step that I cannot but consider as retrograde; and, so thinking, I enter my humble protest against the article referred to, which, I am of opinion, takes an exaggerated view of the evil, and overlooks the many benefits the privilege confers upon Art students.

I am, &c., F. W. R.

Dec. 14, 1860.

Proceedings of Institutions.

Windsor and Eton Literary, Scientific and Mechanics' Institution.—The half-yearly general meeting was held on Monday evening, Dec. 4th, in the lecture hall of the Institute—there was a full attendance of members. In the unadvoidable absence of the President, W. R

Harris, Esq., of Clewer House, was requested, as Vice-President, to take the chair. After the minutes of the previous meetings had been read and confirmed, Mr. C. T. Phillips, who has occupied the post of Honorary Corresponding Secretary for upwards of seven years, resigned his office. The report and balance-sheet were therefore read by the Honorary Financial Secretary, Mr. Chamberlain. From these documents it would appear that, while the Society is not so flourishing as it has been, it is still in a far better position than many of its neighbours. The balance in hand at last audit, £22 13s. 6d., has been increased to £38 7s. 8d., besides £30 (with interest) invested some years since as the nucleus of a new building fund—the liabilities amounting to about the sum in hand and due to the Society. The library has been increased by the purchase of several new books, 46 volumes having been ordered this half-year. The success of the last *fête* was referred to, and the loss the Society would incur, through the resignation of Mr. Phillips, was alluded to, his very valuable services to the body being gratefully noticed. The report and balance-sheet were unanimously received and adopted, it being resolved that copies of them should be sent to H.R.H. the Prince Consort, as patron of the Society. Captain Bulkeley was then unanimously selected President, B. C. Durant, Esq., as Honorary Corresponding Secretary, in the room of Mr. Phillips; six members to serve on the Committee and two auditors. A highly complimentary and cordial vote of thanks was carried to Mr. Phillips for his invaluable services, on the proposition of his colleague, Mr. Chamberlain and the Honorary Librarian, Mr. Lundy; and a further resolution was carried, with equal unanimity, to the effect that a testimonial should be subscribed for by the members generally, and be presented to Mr. Phillips as a slight acknowledgment of the appreciation in which his services were held by the Society, a committee to carry out the resolution being at once appointed. The following votes of thanks were passed:—1st. To the committee and officers of the Society, unanimously; 2nd, to the gratuitous lectures; 3rd, to Copperill Scholefield, Esq., for the very kind use of his grounds on the occasion of the late *fête*; 4th, to the Honorary Secretaries of that *fête*; and 5th, to the local press. An alteration in the rules was then effected, after considerable discussion, as was a resolution, requesting the Committee to take steps towards holding a *soirée* next January, and the meeting was concluded by a vote of thanks to W. R. Harris, Esq., for his efficient conduct in the chair.

MEETINGS FOR THE ENSUING WEEK.

THURS...Royal Inst. 3. Professor Faraday, "On the Chemical History of a Candle."
Philological, 8.

SAT. ...Royal Inst. 3. Prof. Faraday, "On the Chemical History of a Candle."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, December 7th*, 1860.]

Dated 23rd November, 1860.

2866. J. Venables, Burslem, Staffordshire—An improved mode or modes of ornamenting the surfaces of earthenware, also applicable to the ornamenting of other useful articles.
2867. G. E. Dering, Lockleys, near Welwyn, Hertfordshire—Imp. in the permanent ways of railways.
2868. J. F. Caresin, 4, South-street, Finsbury—Imp. in treating canetrash. (A com.)
2869. E. Monkhouse, 6, Caledonian-terrace, Cooks-ground, St. Luke, Chelsea—Imp. in the construction and manufacture, and the fixing or fastening, and the mobility, adjustment and re-adjustment of circular and polygonal heel plates for boots, shoes, and clogs.
2871. E. Keirby, Gatehead Mill, Greetland, near Halifax—Imp. in covering insulating and preserving telegraphic wires and cables.
2873. J. Ancerson, 92, Farringdon-street—Imp. in preparing potatoes for boiling or cooking.
2875. C. Humfrey and C. Humfrey, jun., Wareham, Dorsetshire—Imp. in distilling coal and peat, and bituminous and coaly minerals, and in the treatment of the products therefrom.
2876. G. Bartholomew, Linlithgow, N.B.—Imp. in boots, shoes, clogs, and goloshes.
2877. E. Izod and R. Beech, 13A, Grocers Hall-court, Poultry—Imp. in the manufacture of stay cloth.
2878. T. Gamble and E. Ellis, Nottingham—Imp. in machinery for producing looped fabrics.
2879. T. Hale, 21, Barnsbury-row, Park-road, Islington, and A. Wall, Canton street, East India-road—Imp. in the construction and internal arrangement of furnaces, and in the preparation, manufacture, and treatment of clays and bricks, and other articles made of clay, earthenware, or stone, used for the above and other structures.

Dated 24th November, 1860.

2882. W. R. Bowditch, St. Andrews, Wakefield—Imp. in the purification of coal gas and of coal oils.
2884. C. R. N. Palmer, Southampton—A new portable and improved fixed signal apparatus.
2886. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in sewing machines. (A com.)

INVENTION WITH COMPLETE SPECIFICATION FILED.

2942. C. Stevens, 1B, Welbeck-street, Cavendish-square—Imp. in smoke consuming furnaces. (A com.)—30th November, 1860.

[*From Gazette, December 14th*, 1860.]

Dated 28th August, 1860.

2075. F. C. Calvert, Manchester—Collecting and saving certain products given off or emitted during the manufacture of smoke.

Dated 31st October, 1860.

2661. T. G. Chislin, 24, Southampton-row, Russell-square—Preparing, applying, and adapting certain articles of vegetable production called Eiklonia buccinalis, Proteaceæ, Juncus Serratus, Juncus Trista, and Amaryllideæ, to further new purposes of manufacture."

Dated 2nd November, 1860.

2679. J. Chaumonnot-Delarothière, 4, South-street, Finsbury—Some imp. in stocking frames.

Dated 3rd November, 1860.

2698. R. B. Pilliner, 4, Hatfield-street, Stamford-street, Blackfriars-road, Southwark—Imp. in machinery for compressing black lead or other suitable substances part of which improvements are also applicable to packing various other materials.

Dated 16th November, 1860.

2819. B. Fleet, East street, Walworth, Surrey—Imp. in apparatus for cutting and rounding wood.

Dated 17th November, 1860.

2834. J. Hogg, senr., Edinburgh, and J. Hogg, jun., and J. Hogg, London—Imp. in ornamenting the edges of cloth bound books.

Dated 21st November, 1860.

2854. J. Howden, Glasgow—Imp. in steam engines and boilers, and in the apparatus connected therewith.

Dated 22nd November, 1860.

2862. R. Jobson, Dudley, Worcestershire—Imp. in moulding articles of earthenware or porcelain, and in apparatus used therein.

Dated 24th November, 1860.

2881. A. A. Dalglish, Glasgow—Imp. in engraving or for producing printed surfaces.
2883. R. Harrison, Bacup, and C. Taylor—Imp. in machinery or apparatus for preparing cotton and other fibrous substances for spinning.
2885. S. Walker, jun., Edgbaston, Warwickshire—New or improved machinery to be used in the manufacture of twisted, reeded, and other ornamental metallic tubes.
2887. T. Benton, Sheffield—Imp. in the manufacture of bells, and in alloys of metals to be used in the manufacture of bells.
2889. J. Fowler, jun., R. Burton, and D. Greig, Leeds—Imp. in apparatus for raising, lowering, and hauling weights.
2891. W. Leigh, Goulden-terrace, Richmond-road, Dalston—An improved indicator for railway carriages.

Dated 26th November, 1860.

2893. W. Pearson, W. Spurr, and T. Smith, Bristol—Imp. in looms for weaving woollens.
2895. G. F. Train, Liverpool—Imp. in steam carriages, and in the running gear for street and other railways.—(A com.)
2896. T. Moy, Clifford's-inn—Imp. in direct-action steam engines and pumps.
2897. W. R. Shirtcliffe, Spring-lane, Sheffield—Imp. in warm baths.
2898. J. Birkett, Pemberton-village, near Wigan—Improved musical instruments, particularly applicable to pianofortes and other such like instruments.
2899. S. Roberts, Hull—Imp. in harrows.
2900. G. Mackenzie, Paisley, and J. Hamilton, Glasgow—Imp. in bobbins, or holders for textile materials.
2901. R. Oxland, Plymouth—Imp. in the manufacture of gunpowder.
2902. P. Hugon, Paris—An improved mode of firing or igniting explosive gaseous compounds in motive power engines.

2903. C. H. Jacquet, Lyons—An improved calendar clock.
2904. I. Sharp, and W. Bulmer, Middlesborough, Yorkshire—Imp. in apparatuses for the manufacture and for the drying of bricks, tiles, and other like ware.
2905. F. Seiler, Paris,—An improved apparatus applicable to ships' boats and other navigable vessels, for preventing the dangers of shipwreck at sea or in rivers, and for diminishing their draught of water.
2906. G. Ennis, Jersey—An improved construction of oyster dredger.
2907. J. S. Manton and T. Islip, Birmingham—Certain improved compositions useful for many purposes in connection with the arts and manufactures, and in machinery or apparatus to be employed therewith, which machinery or apparatus is also applicable to several other purposes of utility.

Dated 27th November, 1860.

2909. R. Robertson, Glasgow—Imp. in machinery or apparatus for preparing asphalte.
2910. V. Wanostrocht, Parkstone, near Poole, Dorsetshire—An imp. in the manufacture of mineral tar.
[illegible]12. J. Fowler, Waterford—Imp. in boots, shoes, gaiters, leggings, and overshoes.
2912. J. Smethurst, Guide Bridge, Lancashire—Imp. in slide valves of steam engines, and for other purposes where slide valves are employed.
2913. F. S. Beatty, 16, College-green, and T. Alexander, Kilester-house, Dublin—Imp. in the production of photographic proofs, and their application to printing purposes.
2914. T. Pape, Nottingham—Imp. in circular frames for manufacturing glove and other fabrics, and in apparatuses for stitching and finishing the finger-ends of gloves, and for "bearding" gloves.

Dated 28th November, 1860.

2915. J. B. Lecomte-Alliot, Paris—A machine for waxing and rubbing apartments.
2917. J. Sidebottom, Harewood, near Mottram, Chester—Imp. in reeds, and in apparatus for forming the lease or shed in machines for sizing, dressing, warping, and weaving.
2918. R. Thomas, Bath-street, Tabernacle-square—Imp. in venetian blinds for windows.
2019. D. Mardell, York-terrace, York-square, Commercial-road East—Imp. in steam engines, and in obtaining feed-water for marine steam-engine boilers."
2921. H. Grafton, 80, Chancery-lane—Imp. in apparatus or machinery for cultivating land.
[illegible]22. J. Reeves, Brooklyn, New York—Imp. in the construction of ships.
2923. H. Gillett, Regent-street—Imp. in the ornamentation of the edges of the leaves of photographic albums, especially intended for "cartes de visite."
283[illegible]. N. Ager, 77, Upper Ebury-street, Pimlico—Imp. in apparatus for raising building materials.
2925. T. Holmes, Anlaby-road, Hull—Imp. in preparing and in tanning hides and skins.
2926. S. Thomson, Motherwell, Lanark, N. B.—Imp. in the manufacture of Iron.
2927. J. Jeyes, 17, Cheyne-walk, Chelsea—Imp. in the manufacture of boots and shoes.

Dated 29th November, 1860.

2929. H. Gilbee, 4, South-street, Finsbury—Imp. in welding. (A com.)
2930. H. Hirsch, Bridge-road, Lambeth—Imp. in screw-propellers.
2931. W. Darley, Bishop Bridge, Market Rasen, Lincolnshire—Imp. in portable steam engines.
2932. R. Offord, jun., 79, Wells-street, Oxford-street—Imp. in the adaptation of india rubber and compounds thereof to wheels.
2933. W. M. Storm, New York—Imp. in the construction of breech-loading fire-arms.
[illegible]. J. A. Jaques and J. A. Fanshawe, Tottenham, and G. Jaques, Bromley—An improved mode of and apparatus for cooling liquids.
2936. T. Cole and D. Gardner, Coventry—Imp. in looms for weaving ribbons and other fabrics.

Dated 30th November, 1860.

2939. E. C. Perry, Sedgley, Staffordshire—Imp. in preventing accidents in or at mine shafts.
2940. G. Parsons, Martock, Somersetshire—Imp. in the construction of wheels.
2941. E. T. Hughes, 123, Chancery-lane—Imp. in the manufacture of metal tubes. (A com.)
2943. J. Pelegrin, Bordeaux, France—Inodorous basins and descent pipes of glass.
3944. R. C. Newberry, 4 and 5, President-street West, Goswell-road—Imp. in the manufacture of collars and wristbands.

Dated 1st December, 1860.

2496. H. Greaves, 22, Abingdon-street, Westminster—Imp. in the construction of railways, tramways, and in vehicles to run thereon, portions of which improvements are applicable to other useful purposes.
2948. C. Farmer and W. Farmer, Birmingham—New or improved machinery for the manufacture of the hooks used principally as dress fastenings.
2949. W. S. Losh, Wreay Syke, Cumberland—A new method of preparing sulphurous acid in solution.
2950. W. L. Tizard, Mark-lane—Imp. in fastening threaded nuts and bolts.
2851. R. Marsden, 22, Anson-street, Park, and W. Lamber, 9, Castle-hill, Sheffield—An imp. in horses shoes.
2953. J. Austin, Donaghadee, Ireland—Imp. in machinery or apparatus for ploughing or cultivating land, part of which machinery or apparatus may be used as a traction engine.
2855. W. Clark, 53, Chancery-lane—Imp. in looms. (A com.)
2956. A. Leonhardt, Berlin—Imp. in the preparation of indigo for dyeing and printing, and in obtaining "pure" or "refined" indigo.

Dated 3rd December, 1860.

2957. W. P. Piggott, 16 Argyll-street, Regent-street—Imp. in the mode of generating electric currents, manufacturing submarine telegraph cables, and the mode of transmitting signals.
2959. W. Pilkington, Windle-hall, Lancashire—Imp. in furnaces for melting glass.
2691. T. Richardson, Newcastle-upon-Tyne—Imp. in the manufacture of paper.
2963. E. T. Hughes, 123, Chancery-lane—Imp. in treating and decomposing fatty matters, and in the machinery or apparatus employed therein. (A com.)
2965. R. A. Brooman, 166, Fleet-street—Imp. in valves for closets and other receptacles. (A com.)
2967. G. Macfarlane, Draycott-street, W. E. Newton, 66, Chancery-lane, and R. Carte, Charing-cross—Imp. in wind musical instruments.

Dated 4th December, 1860.

2969. W. R. Jeune, 4, Flower terrace, Campbell-road, Bow—Imp. in the manufacture of kamptulicon or covering for floors, and for other purposes.
2971. E. H. Higginbotham and A. Beech, Macclesfield—Certain imp. in machinery or apparatus for the prevention of explosions of steam boilers, arising through deficiency of water or over-pressure of steam.
2973. W. T. Walter, Long-acre, and C. Henry, Bartholomew-place Hertford-road, Kingsland—Imp. in means or processes for obtaining ornamental and other devices or effects on metal glass, stone, and earthenware.
2975. F. Michaux, Anzin, France—A new sort of "safety lamp for mines."

Invention with Complete Specification Filed.

3039. A. Verwey, 3, Croydon-grove, Croydon—Imp. in the proportions of ingredients and mode of manufacture of a chemical compound for softening water.—11th December, 1860.

Patents Sealed.

[*From Gazette, December 14th*, 1860.]

December 14th.	1508. W. P. Eastman.
1476. T. Kershaw.	1510. W. Clark.
1480. T. W. Keates.	1512. A. T. Clark and J. Price.
1485. J. Harrison.	1514. A. Jutteau.
1486. J. Walker.	1532. H. Jones.
1489. W. Kendall and G. Gent.	1554. J. Fletcher.
1491. W. W. Sleigh.	1555. G. T. Peppé.
1497. H. F. Hiron and R. Fell.	1663. F. Boex.

[*From Gazette, December 18th*, 1860.]

December 18th.	1541. H. Creaser.
1504. W. A. Munn.	1549. M. Cartwright.
1505. D. Lee and A. Welsh.	1587. J. Newhouse.
1506. T. Walker.	1633. B. Lambert.
1507. W. Baker.	1641. J. Bircumshaw.
1517. W. Howells.	1779. G. H. Birkbeck.
1525. J. Dewick.	1893. J. F. Klintin.
1527. J. Ramsbottom.	2363. A. Warner.
1529. J. Joyce and A. Morley.	2645. W. E. Newton.
1539. D. C. Dinsmore.	

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, December 14th*, 1860.]

December 10th.	*December 12th.*
3174. H. Desmoutis.	3076. W. Smith.
December 11th.	3195. H. Hanson.
3068. H. D. P. Cunningham.	

[*From Gazette, December 18th*, 1860.]

December 13th.	3084. T. Howard.
3161. G. Burley.	*December 15th.*
December 14th.	3145. G. Bridge and J. Hamer.
3078. J. Bradley.	

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, December 14th*, 1860.]

December 11th.	*December 12th.*
2892. C. Schiele.	2942. J. Greenwood.

[*From Gazette, December 18th*, 1860.]

December 14th.	*December 15th.*
2951. A. E. L. Bellford.	2956. J. L. Clark.

Journal of the Society of Arts.

FRIDAY, DECEMBER 28, 1860.

COUNCIL.

At the last meeting of the Council, Mr. Henry Cole, C.B., was elected a Vice-President of the Society, to fill the vacancy caused by the death of the late Mr. Matthew Uzielli; and Mr. Matthew Henry Marsh, M.P., was elected a Member of Council, in the room of Mr. Henry Cole.

EXAMINATIONS, 1861. — NOTICE TO INSTITUTIONS AND LOCAL EDUCATIONAL BOARDS.

The attention of Secretaries of Institutions and Local Boards is specially called to Par. 5 of the Programme of Examinations for 1861, as follows:—

5. A detailed list of the chairman, secretary, and other members of each Local Board, giving not only their names but their addresses and designations, should be submitted to the Council of the Society of Arts before the 1st of January, 1861. In some cases the Local Educational Boards comprise such large districts that for the convenience ot the Candidates, Branch Local Boards have to be formed within the Districts. Wherever this is the case, the names and addresses of the members, both of the District Board and of its Branch Boards, must be forwarded to the Secretary of the Society of Arts. All changes in the composition of the various Boards now in existence, or to be formed hereafter, should be immediately notified to the Society of Arts.

LAMBETH SCHOOL OF ART.

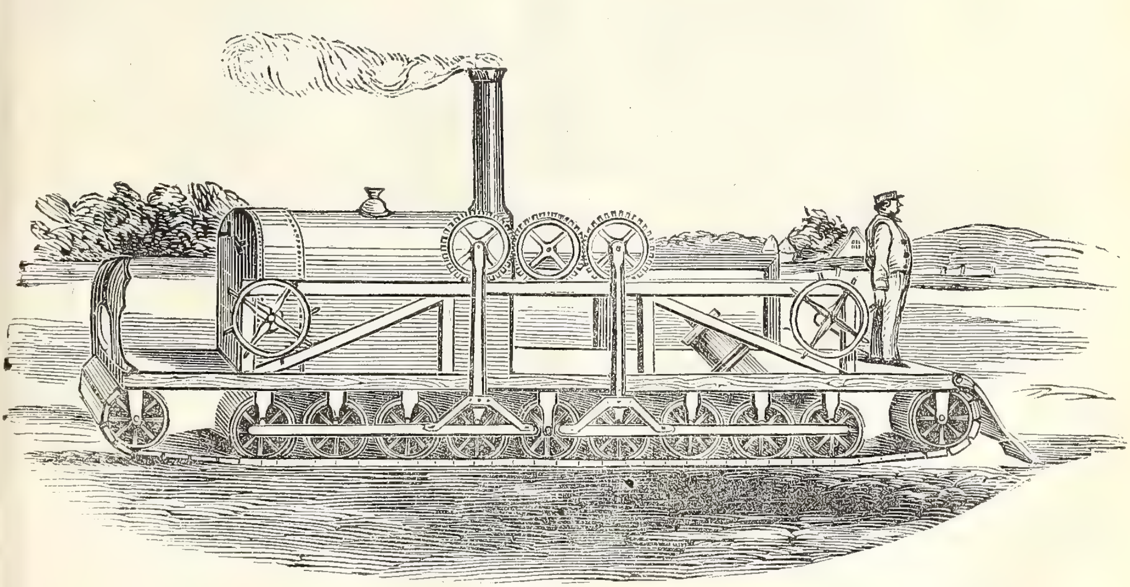
The students of the Lambeth School of Art propose to hold a conversazione at the South Kensington Museum, on Saturday evening, the 12th January, in aid of the fund for their new building. The charge for admission will be one shilling.

PATENT LOCOMOTIVE CULTIVATOR.

This machine invented by Mr. Henry Grafton, consists of a framework, with a series of broad driving wheels on each side, having air tubes or India-rubber cushions round the peripheries and travelling on a self-acting endless rail.

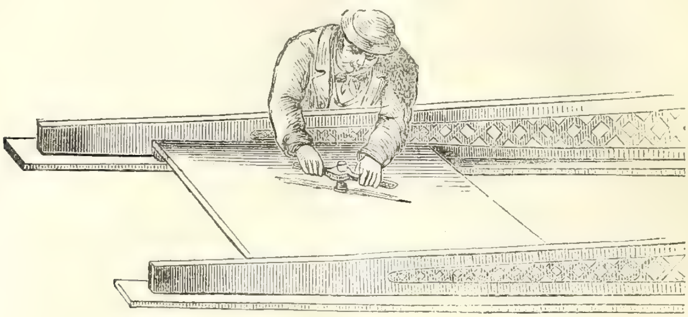
The framework is made chiefly of iron, and somewhat resembles the Guideway platform invented by Mr. Halkett,* being fifty feet or more wide, so as to pass over and harrow, drill, hoe, &c., the whole of that breadth of land at the same time, and to plough as great a part as the power of the engines employed will allow, without the slightest pressure on the land under tillage. It is made with a series of girders resting on, and at right angles to, the side trussed girders. These side girders form receptacles for the engine and boilers, and for the supply of coal and water (Fig. 1), and are boarded in. In this arrangement the weights are thrown to the lowest point of the machine, and space and heat economized. The cross girders can be disconnected from the side girders, and the latter brought side by side, to facilitate the conveyance of the machine from one field to another, on the common road. Such a removal from one small enclosure to another is not however, contemplated. All the implements to be used (whether ploughs, harrows, hoes, drills, reaping machines, or others) will be suspended from the framework, and are to be of the ordinary construction, divested of wheels and shafts, fixed in frames running between the cross girders, capable of being moved from one side of the cultivator to the other. (See Fig. 2, showing a traversing plough frame, with cross head and screw lever, as seen from above the platform.)

Fig. 1.



* See *Journal*, Vol. vii., p. 41.

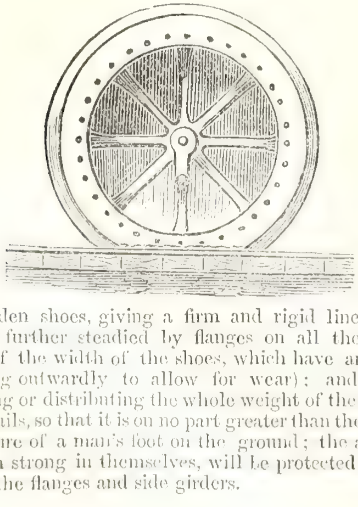
Fig. 2.



The carriage of crops, manure, &c., is done by means of a frame, with a flat floor suspended from the girders by iron straps within eighteen inches of the ground, or lower if suspended from the middle of the cross girders, without any supplementary trucks or waggons. This frame can be lowered to the ground, and by a pair of screws and lever nuts, raised again to the required height. The engines are not in anyway connected, and the inventor says there is no occasion for them to be so, as both sides of the Cultivator progress at the same rate, even if the engines be of different power; no motion takes place on one side of the Cultivator without being communicated to the other side, through the framework, the bracings and great strength of the girders and general trussing precluding any contrary action, for even if one series of wheels have to pass over any slight elevations or undulations, and so to transverse a greater length of land than the others, the velocity or revolutions of such wheels will increase accordingly. The engines have reversing gear, and, by means of a clutch, may be used for other farm purposes by disconnecting them from the propelling wheels.

The series of broad wheels shown in Fig. 1, (each wheel being a driving or propelling wheel), forms a very important part of the machine. They have air-tight tubes or cushions, filled with air or water round the peripheries or circumferences, encased in very strong vulcanized India-rubber fabric so as to give, by weight of the machine, a flat surface of equal pressure on the whole of the shoe of the endless rail (Fig. 3). This equal pressure of the wheels by the flattened surface of the cushions upon the rail is stated to have the effect of closing up the openings or joints of

Fig. 3.



the wooden shoes, giving a firm and rigid line of rail, which is further steadied by flanges on all the driving wheels of the width of the shoes, which have angle-iron (adjusting outwardly to allow for wear); and also of equalizing or distributing the whole weight of the machine on the rails, so that it is on no part greater than the amount of pressure of a man's foot on the ground; the air tubes, although strong in themselves, will be protected from injury by the flanges and side girders.

This is the first time air-wheels have been brought before the public in connection with Steam Agriculture, but they have been used on the wheels of vehicles on the common roads in London; and a Brougham with tires of this sort has been known to run upwards of 2,000 miles at the average rate of eight miles an hour; in this case the wheels will only make twenty revolutions in a minute, and will be travelling on a smooth surface, circumstances that, it is thought, will ensure their continued good condition.

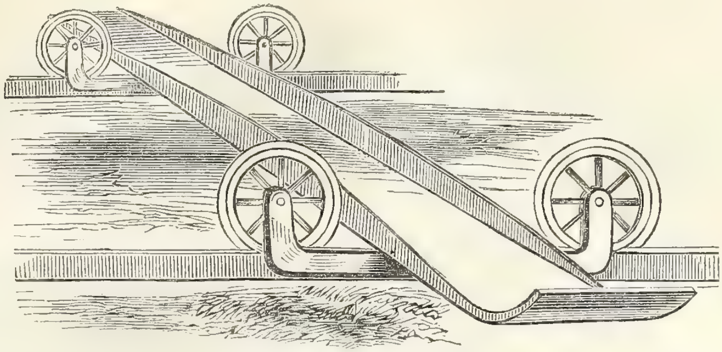
The endless railway consists of a continuous belt of very strong India-rubber combined with flax threads, having wooden shoes about twelve inches by eighteen, shod with iron, fastened to it by a staple across the centre of each shoe, at right angles to the belt, which permits it to pass round the drums placed before and behind each series of wheels, and through the side girders under the engines; the rail is quite noiseless, and has no mechanical or metal joints; the machines can be slightly guided when required, by the drums laying the rails being moved to the right or left by means of a circular lever, which also guides the leading wheels.

In front of the drums and driving wheels is a spade plough, similar to a scraper before a common locomotive, but of different shape, for the purpose of clearing a regular path and removing all impediments, to permit of the rails being laid down moderately even.

The headland is to be laid with rails, forming a permanent and more convenient mode of taking the Cultivator from the homestead to the field, or from field to field. The rails are to be about twelve feet apart, and will receive the Cultivator after it has traversed over, and operated upon, one stretch or breadth of land, by means of two separate beam trucks (Fig. 4); the Cultivator being received on these trucks, is worked to the next breadth of land by means of radial arms, lowered from the engines, having at the ends propelling wheels. The headland rails have distinct marks at every fifty feet, to serve as points from which the Cultivator will start from time to time for the opposite side of the field, where a flagstaff may be left as a guide, if thought proper, and thus the wheels and endless rails will thereby always pass over the same ground, and in course of time, form hard and permanent roadways across the fields, about a foot-and-a-half, or two feet wide, at intervals of every fifty feet, taking no more land from actual tillage than the present open furrows. The land would thus be cultivated in strips of fifty feet, upon which no pressure, either of the Cultivator or implements, will take place.

The ploughs are right and left (Fig. 5) suspended upon the girders and attached to the plough, having a rack arrangement for raising and lowering them into working position. The cranks of the driving-wheels have Clark's compensating connecting beams, to allow for all undulation which may arise on the land; this permits the rails in connection with the elastic tires to find a line conforming to the land over which the Cultivator passes. Independently of these, arrangements are made

Fig. 4.



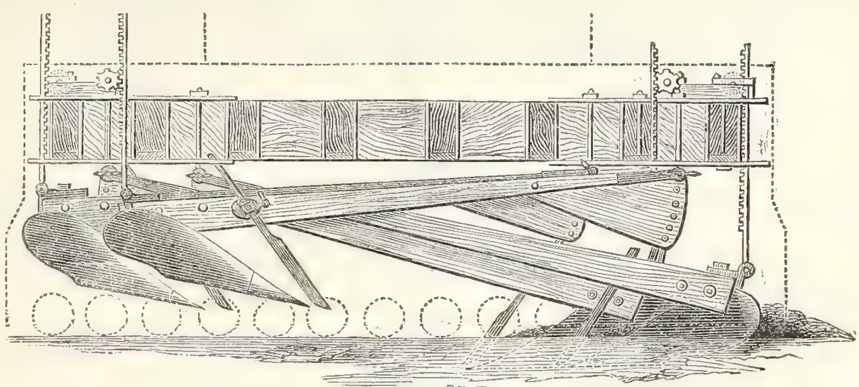
for balancing the cross girders loaded or otherwise, which permit this description of locomotive to be made light and strong.

The space of twenty-five feet of headland may be cultivated as grass land, and have a framework of wire fencing moving on wheels to separate it from the arable part, and this fencing roofed in so as to shelter cattle. It may be moved by means of a winch.

In small enclosures one headland will suffice, but in large fields a headland on each side is preferable.

On the framework of the Cultivator, a temporary cabin is erected for the use of the engineer and attendant, when far from the homestead, whose duties will be to take care of, as well as work, the machine, and an awning may be thrown over to protect the men from the heat of the sun or weather, when at field work.

Fig. 5.



The following estimate of the annual expenses of a farm of 1,000 acres, cultivated by steam-power under this system is given by the inventor:—

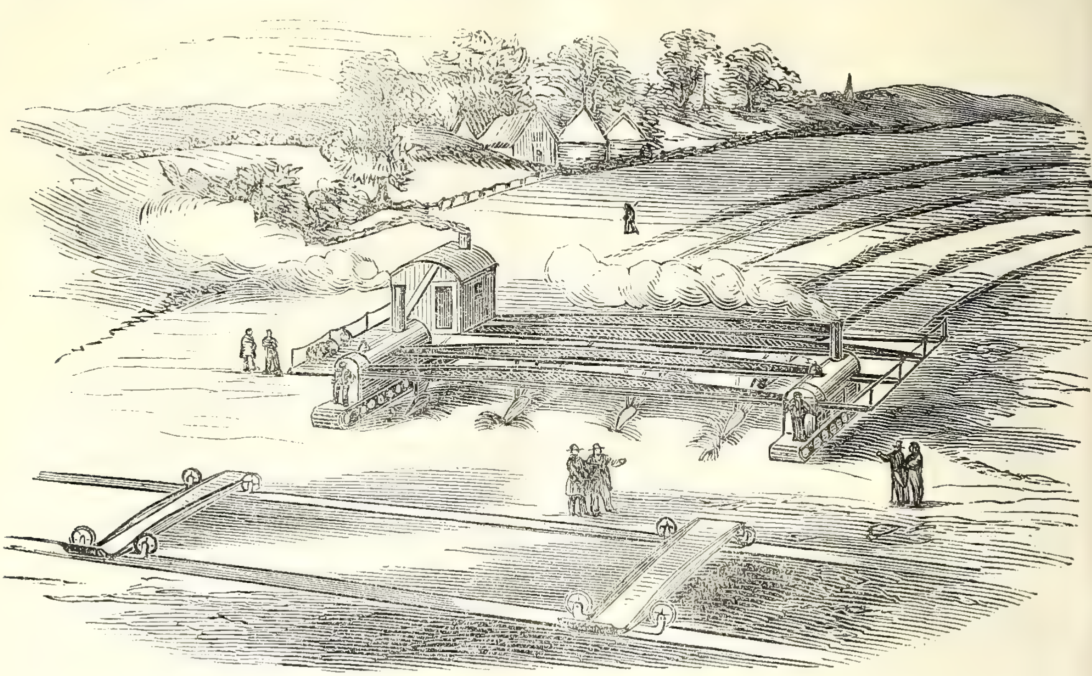
	£	s.	d.
Expenses and depreciation of endless rail, locomotive, and implements, costing £1,500 at 15 per cent.	225	0	0
Coal at 20s. per day, 250 days	250	0	0
Oil, &c.	10	0	0
Engine driver at 4s. per day and two attendants at 2s. per day each	124	16	0
5 constant labourers	155	0	0
Labourers for hand operations	50	0	0
	£814	16	0

Annual expenses of a farm of one thousand acres, cultivated by horse-power under the present system on clay lands:—

Statement by Mr. W. Rex, Valuer to Messrs. Chinnock and Galsworthy, Land Agents, London, and a Farmer, for a Farm of 200 Acres, Well Tilled Land.

Capital: — 8 horses, 4 ploughs, harrows, horse-hoes, scarifiers, 2 waggons, rollers, 4 carts, £500

			Annual		
Depreciation of stock at 15 per cent. ...			£ 75	0	0
Horse-keep, corn, 100 qrs., hay 30 tons ...			244	0	0
Labour, 4 carters, at 12s. per week	£124	16s.			
1 horse-keeper extra	31	4			
3 labourers	105	6			
			261	6	0
100 acres corn hoeing, 4s.			20	0	0
Cutting 50 acres of corn at 8s.			20	0	0
			620	6	0
Multiply by 5 for 1,000 acres ...					5
			3,101	10	0
Deduct 15 per cent. on £200 the saving in machinery on a large over a smaller			30	0	0
Farmers' annual field expenses for ordinary cultivation on the fourth or fifth shift system, exclusive of all extra labour for harvest, &c., but including all that can be done by the machinery in the field ...			3,071	10	0
Deduct estimated cultivation by steam			814	16	0
Estimated difference in favour of this system			2,256	14	0



GRAFTON'S SYSTEM OF STEAM AGRICULTURE.

METROPOLITAN BILLS FOR THE SESSION OF 1861.*

The *London Gazette* for the month of November contains notices for a large number of bills affecting the metropolis, as well as for many which affect the large northern centres of industry, either separately or together with London. Of these various proposals, which, considered as a whole, seem truly gigantic, the most considerable are those affecting locomotion by means of additional railway communication, either by steam-power or horse-power; and connected with the latter are the numerous schemes for laying down tramways in the public streets. The railways of London, and their interpenetrations with the cobweb of streets which the combined ingenuity and obstinacy of ten centuries have produced, demand however, our first attention.

The decision of the Commisioners that no railways should be allowed to be carried further within the limits of the metropolis than the stations then in existence, has been reversed by common consent.

The Brighton Company obtained their West-end and Crystal Palace line, and the Victoria Station was opened to the Chatham and Dover and to the Great Western lines, with which neither the South Eastern nor South Western was connected. The two latter combined to carry out the whole plan of the South Western in the Charing-cross Railway, evidently an improvement for business purposes upon the Victoria Station.

The Metropolitan Railway, which for years waited the assistance of the Great Western and Great Northern Companies, its Act having been obtained in 1854, is now constructing.

The London, Chatham and Dover have obtained their act for a direct line into the City to meet the metropolitan, and the central station of the latter becomes a great centre of interest.

* Contributed to the *Building News* by Mr. J. M. Rickman.

All the lines are thus connected, and have obtained good western stations, the only link between the main lines now required being that to continue the Eastern Counties into the Metropolitan. This line passes through Finsbury-circus, and everything agrees now to point out that situation as the site for the Eastern Central Station.

The increasing importance of the Kensington Museum, and the position of the intended Exhibition of 1862, are the leading causes for the projects to connect the district of South Kensington with the main lines.

The whole system of metropolitan railway communication becomes, under the conflicting interests of the now powerful companies, so complicated that it is somewhat difficult to apportion the schemes to the real wants of travellers.

To commence, however, in our endeavour to intimate the several schemes now before the public, the outlying railways may be first considered, commencing from the east.

London and Bury St. Edmunds Railway,—This is a proposed direct line to Bury, commencing at Barking on the London, Tilbury, and Southend line, going through the agricultural and picturesque districts of Chipping Ongar, Dunmow, and Haverhill, between the Cambridge and Colchester trunks of the Eastern Counties line, having junctions with the authorised "Colne Valley and Halstead Extension" and "the Sudbury and Clare" railways.

The following projects are intended to connect the Eastern Counties and Great Northern lines with the western main lines, or to act as feeders thereto, opening up parts of the suburban districts.

Hornsey and Tottenham Railway.—This is a proposed junction line from Wood Green on the Great Northern Railway to the Cambridge line of the Eastern Counties Railway at Tottenham.

North Eastern and South Western Railway.—This line

proposed to form a continuation northwards of the North and South Western Junction Railway. It commences near the Willesden station of the North Western line, having junction with the North Western, Great Western, and West London Railways, and continuing through Hendon and Finchley to East Barnet station on the Great Northern, and having a branch from Hendon passing through Hornsey, with a second junction with the Great Northern line, and joining the Eastern Counties Railway Cambridge line at Tottenham.

Barnet and Willesden Railway Company.—The line here proposed is from the Barnet station of the Great Northern Railway to the Hampstead Junction Railway.

North Metropolitan Junction Railway.—This is a proposed line from the Hampstead Junction line at Gordon House-lane, Kentish Town, to the Hornsey station of the Great Northern, and thence to the Tottenham station of the Eastern Counties line, having double junctions with each.

Edgware, Highgate, and London.—Commencing at the turnpike at Edgware, the proposed line would pass through Hendon and Highgate, and, by junction lines, would be connected with the North London, Hampstead Junction, Great Northern, and Metropolitan lines.

Some important notices were given by the Northern and Western lines affecting their general policy, which should be introduced here.

The London and North Western, the Great Northern, the Manchester, Sheffield, and Lincolnshire, and the Midland Railway Companies apply for an act to sanction and confirm contracts and arrangements made between them with respect to the use, working, management, and maintenance of all their undertakings, and for the settlement of their mutual traffic arrangements, and for the appointment of persons authorised to carry into effect their contracts.

Birkenhead Railway.—Application is made with a view of transferring this concern to the North Western and Great Western companies, for their joint use, for a term of years.

Great Western Railway Company.—This is a proposed act to settle the capital of the Railway Company, and to enable them, if it should be decided to be advantageous, to lay down narrow gauge from Reading, and to raise capital for that and other purposes.

By another notice the same company applies for extension of time for sale of their superfluous lands, which under the "Land Clauses Consolidation Act," is limited.

The next list contains important feeders to the North Western, Great Western, and West London Railways.

St. Albans and Shefford Railway.—This is a line proposed by the North Western Company (from their St. Alban's line), and by the Midland Company (to their Shefford Station) to connect their lines, and to join and cross the Hertford, Luton, and Dunstable Railway.

London, Buckinghamshire, and West Midland Railway.—This is a project for a direct line from Oxford to London. It commences by junction with the West Midland (late Oxford, Worcester, and Wolverhampton), and with the Oxford branch of the North Western Railway at Yarnton, and passing through Thame (with a branch to Aylesbury), Amersham, Brentford, and Chelsea, terminates with a junction with the authorised Kensington station line at Earl's-court, with a branch to the West side of Sloane-street, and junctions with the West London Railway, and with the North and South Western Junction Railway.

Metropolitan and Great Western Railways.—Extension to Richmond.—The Great Western Railway, having already a branch going in an easterly direction to Brentford, propose to use part of it, with the assistance of two branch lines at Hanwell and Isleworth, to draw the traffic from the south-western foot of Richmond-bridge. It is also proposed to have a junction with the loop line of the South Western Railway.

Hammersmith, Paddington, and City Junction Railway.—This is a proposed line from the Broadway, Hammersmith, to the Great Western, with a double junction with the West London.

Hammersmith Junction Railway.—This is a proposed line from the Hammersmith station of the North and South Western Junction Railway Extension, passing througq Shepherd's-bush, and terminating by a double junction on the West London Railway.

The following refer to the present position of the West London and Victoria Station Companies:—

West London Extension Railway.—This is an application to modify the powers under the extension act of the West London Extension Company, obtained last session, by altering the position of the dock near the entrance of the Kensington Canal, the abandonment of the river branch at that place; to widen Pig-hill-lane from the arch over the South Western Railway to Latchmere-lane, Battersea, and to make other alterations in the lane thereabouts; and to provide, if thought fit, for the dissolution and winding-up of the West London Railway Company.

London and North Western Railway.—The company applies for confirmation of an agreement with the Brighton, the Dover Direct, and the Great Western Railway companies, respecting the joint use of the Victoria Station, Pimlico. It is also proposed to alter the levels of the Kensington and Hammersmith turnpike-road, where it crosses the West London Railway.

London, Chatham, and Dover Railway Company.—The company applies, among other requirements, for a confirmation of an agreement for the use of Victoria Station, and to obtain further land at Battersea for station purposes.

Victoria Station and Pimlico Railway.—This company applies for power to raise additional capital, and to give effect to agreements with the Great Western and Dover Direct Companies for the use of Victoria Station.

There are three for additional junction lines in the Southern part of the metropolis; the last is a bold scheme.

West London Extension, and London, Brighton, and South Coast Junction Railways.—This is a proposed south metropolitan line, commencing out of the West London Extension line, at Battersea, and connected with the Crystal Palace line, passing through Camberwell and joining the Brighton line and Thames Junction Railway near New-cross.

South London and City and West-end Junction Railways.—This is a proposal based upon the London, Chatham and Dover Railway, intending to connect it with the main line and branches of the Brighton Railway Come pany. The new lines will consist of a railway from th West-end section of the Dover line, at North Brixton, and terminating by a set of small junction lines with the Brighton and Thames Junction lines at New-cross, having also a junction with the City section of the Dover line in Lambeth, and also a line at Battersea joining the Battersea line of the West-end and Crystal Palace Railway with the West-end section of the Dover line.

Charing-cross Railway (City Terminus).—This is a proposal for providing a City terminus for the Charing-cross Railway, for the special benefit of the South Eastern line. Having a double junction with the Charing-cross line to the south-west of St. Saviour's church, and having a bridge across the Thames, the line would terminate at Turnwheel-lane, on the south side of Cannon-street.

In the south-eastern district are the following:—

South Eastern Railway.—Apply for powers to subscribe further sums (raised by bonds or preference shares) to the Charing-cross Railway. Also for powers to alter-by-laws of Greenwich Railways, and to consolidate their accounts.

Greenwich and Woolwich Railway.—A line is here proposed from the Greenwich at Deptford-creek to Edward-street, East Greenwich, and a branch from the same to connect it with the North Kent Railway at the Charlton station.

Mid Kent Railway (Croydon Extension).—The company

applies for power to continue their proposed extension to Coombe-lane.

Having now returned nearly to the starting point, the central lines claim examination. The South Kensington Museum draws the following schemes:—

Kensington Station, and North and South Junction Railway.—This company, which obtained its Act last year, applies for enlarged powers, and proposes to construct the following additional sections of railway:—A junction with the West London Extension Railway, at the corner of the Kensington Canal Basin. An extension from Love-lane to the corner of the Gloucester-road and the Cromwell-road, and so on to the eastern side of the Queen's Gate-road. They also apply for powers to join any other company having similar objects.

Metropolitan Railway (*Western Extension*).—The extension here proposed to the Metropolitan Railway is a continuation from the front of the Paddington station along Conduit-street and Craven-hill to the Queen's-road, and thence having branches to Notting-hill and through the Broad-walk in Kensington-gardens to Noel House, near the toll-bar in the Kensington-road, and a further extension to the intersection of Cromwell-road with Prince Albert's-road.

The Metropolitan Railway forms the introduction to the Smithfield Market and Finsbury-circus station, connected with which are the following, which will sufficiently explain the proposed undertakings, which can hardly be considered as competing schemes, but rather as parts of a very serious project, though it must be a long time before we see the whole carried out.

West-end and City Railway.—This is a proposed underground railway from Regent-circus, Piccadilly, through Coventry-street, Leicester-square, Long-acre, Great Queen-street, and part of Holborn, and across Victoria-street, to the authorised "Metropolitan and London Railway Depôt," lines at Smithfield-bars.

Metropolitan Railway.—The company applies for an extension of time in carrying out their arrangements; for power to take additional property in the neighbourhood of Praed-street, and thence to Stafford-street, Paddington, and to widen their line, and to take additional property between King's-cross and Ray-street, Clerkenwell; to form an additional junction line at King's-cross, and another to the proposed meat and poultry market at Smithfield-bars, in place of that previously authorised; to confirm the agreements made with the City authorities for the purchase of land adjoining the station, and for the construction of an underground depôt and station at Smithfield.

The company also applies for power to continue their Smithfield Extension line to Finsbury-pavement.

Finsbury Circus Railway Station.—This is a scheme to provide station accommodation at Finsbury-circus for the proposed Eastern Counties and Metropolitan Extensions; the district proposed to be used is bounded as follows, beginning at the south-west:—Moor-lane, New Union-street, Little Moorfields, South-place, Eldon-street, Broad-street-buildings, New Broad-street, Bloomfield-street, London-wall, and Fore-street. The various streets now leading to Finsbury-circus would be stopped up; a new street would be opened from the south end of Circus-place in London-wall, running south-west into Moorgate-street; and a street would be cut from the centre of the last mentioned to the north-east corner of the Bank of England. These new streets would open up the miserable district at the back of Tokenhouse-yard.

North London Railway.—A line is proposed from Ball's-pond, connected by a double junction with the present line, and running into the City, having its terminus in the space enclosed by Liverpool-street, Bloomfield-street, Eldon-street, Long-alley, Sun-street, Peter-street, and Broad-street-buildings.

The North London Railway Company also proposes to widen the line between York-road and Kingsland-road.

Eastern Counties and Finsbury Railway.—This is a scheme for continuing the Eastern Counties line from Shoreditch to Bloomfield-street, Finsbury-circus. The linewould commence at Arundel-street, Bethnal-green, keeping south of the Shoreditch station. A new street would be formed in continuation of Phœnix-street to New James-street, in place of the present streets in that district. The line would cross the New Commercial-street and Norton-folgate, and then, going through the low courts and alleys west of Bishopsgate-street-without below the surface, arrive at the west side of Bloomfield-street.

The present streets between the northern part of Commercial-street and Norton-folgate would be obliterated, and a new street cut at right angles to Commercial-street from the end of White Lion-street to the street which has been long laid out on the north side of the church now building in Commercial-street. Part of Liverpool-street would also be stopped up, and Broad-street-buildings widened in line with Eldon-street, and continued across into the eastern part of Liverpool-street. As the railway would be mostly under the surface, the present sewerage would be disturbed, and consequently a new sewer would be constructed from Norton-folgate to Finsbury-pavement, to divert all the sewage into the latter direction.

The Court of Common Council have adopted a report of their Improvement Committee, relative to the establishment of a central railway station in the city of London. The report stated that it was absolutely necessary that there should be a central railway station in the City, and that the best site for it would be Farringdon-street;—that the effect of having the station at this spot would be materially to improve Holborn-hill and Skinner-street, and reduce the gradient from one foot in 19 to one foot in 40 in the case of Holborn-hill, and one foot in 46 in Skinner-street, which alone would be a most important improvement; that it would also greatly improve the City property in Farringdon-street and Victoria-street, and be of very great importance in conection with the proposed new market in Smithfield. The report concluded with a recommendation that the court should continue their powers to carry out the proposed plan.

PLASTIC WOOD.

The Paris correspondent of the *Times* states that an artist in Paris has made a discovery which will effect a complete revolution in the manufacture of cabinet-work. He has found a means of rendering any description of wood so soft that it will receive an impression either of the most varied sculpture or of the most delicate chasing. The wood is then hardened to the consistency of metal, while the impressions remain perfect. The artist has already completed some splendid sculptured articles, such as picture frames, inkstands, chests, and liqueur stands. With the introduction of this new art, it is expected that articles of household furniture will be considerably reduced in price.

MEMORIAL OF CROMPTON.

The people of Bolton have subscribed to erect a statue to Samuel Crompton, who invented the "mule," which has given fortunes to hundreds and bread to thousands. After some discussion the commission has been given to Mr. W. Calder Marshall, R.A.

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS.

(*Continued from page* 79.)

Mines.—Throughout the province of Iquique have been discovered metals, gold, silver, copper, and iron; towards the southern boundary stream, tin and lead; and towards

the Cordillera, platinum. The silver mines of Huantahaya and of Santa Rosa, respectively 7 and 12 miles from Iquique, once so productive, are almost entirely abandoned; 2 at Huantahaya only are constantly worked. The other mines are occasionally entered by a few Indians to gather stray pieces of ore, from which they extract the metal, and bring it mostly in small pieces of *pina* under one pound in weight, to Iquique for sale. For some years mining in this province has been much neglected, owing to the scarcity of labour and the high rate of wages paid since the commencement of the nitrate of soda trade, as well as the inconveniences of having to bring fuel, water, and provisions from distant parts, but of late attention is again being paid to it.

At Tabucaga, about 50 leagues E.N.E. of Iquique, at an elevation of some 10,000 feet, Messrs. George Smith and Co. are operating upon a large mass of "desmontes," and extracting, it is said, a profitable quantity of copper; it appears that these mines, at some distant date, had been worked for silver.

On the plain, about two miles from Iquique, Mr. John Williamson is working a copper mine which promises well; some ores taken from it during the year 1854 were sent to England to be smelted, their yield was over 60 per cent.

GUANO.—The island of Iquique was once thickly covered with guano; in the present century, whilst under the dominion of Spain, it was sold for 60,000 dols.; it has long since been cleared off. Between the Caleta of Pavillon and the river Lox, some 15 leagues, are many deposits, some several furlongs in length; it is chiefly taken away by small craft, "Huaveros," to supply the villages in the interior, and the ports to the north.

BORATE OF LIME AND OF SODA, in small lumps, covered with clay, was discovered in the province of Iquique in the year 1852. The first shipment made was a small quantity belonging to Mr. Peter King; in November of that year some parcels sent realised in England over £3 per cwt.; a prohibition to export it was published in 1853, on the plea that the trade of the province was to make nitrate of soda, and not to export a crude article; since then exporters have been obliged to obtain a licence from the supreme Government before they could ship. The exportation has been under 15,000 quintals; the price on the beach is now from 3.2 dols to 3.4 dols. per quintal.

PHILIPPINE ISLANDS.—The coasts of the Philippines extend 800 miles in length, and are deeply indented with bays; the interior is intersected by lakes and rivers, which in two parts of Manilla, their principal island, and seat of their capital, bring the opposite seas of China and the Pacific within a few leagues of each other, across a district very easily traversable; while the rest of the island (through which flow two principal lines of foreign navigation, between Europe and China, and the Philippines of South America,) are so situated in relation to each other, that their separation promotes more than their union would do a facility of internal and external communication strikingly attributable to the whole group, and peculiarly favourable to commercial and industrial relations.

The soil of the Philippines is exuberantly rich, and the commercial products of hemp, tobacco, sugar, indigo, coffee, sapan wood, rice and cocoa, are very extensively cultivated in some of the provinces, and susceptible of being so distributed among all the others.

Through this group is spread a population of from 3,500,000 to 4,000,000 of inhabitants who are christianized, and with the exception of a few mountain and petty tribes and the Mahometans in Mindanas, live in peaceful subordination to the official agencies of the Government here.

In the Island of Panay, which is below the 12th degree of latitude, and generally described by the name of its chief province Iloilo, the population is 559,861. The adjacent islands, Leyte and Samar, contain unitedly, nearly 300,000, and in Luzon, the population is little short of 2,000,000.

They are divided into three commercial divisions, north, central, and south, to the central giving all the provinces between the 13th and 15th degrees of latitude, to the south the group of Islands below the 13th, and to the north giving only three of the provinces, Pangasnian and the two Ilocoses with their dependents, Abra and the Union, and from this last division excluding the great range of country along the Pacific; each of these three divisions has a distinctiveness of character and commercial importance, in population, productions, wealth, industry and intelligence.

The northern part is very highly cultivated, and embraces a population of 724,946 inhabitants; and parallel to it is the large, though not numerously populated Province of Cagayan, not included in that division, and in which is cultivated the finest quality and largest quantity of tobacco in the Philippines.

The Southern Division contains a population of upwards of 1,200,000, and the central, which depends especially on Manilla, within the degrees of latitude I have indicated, is a zone of very great natural resources, and of varied productions, extensively cultivated, and containing nearly 1,500,000 of inhabitants.

Each of these divisions is of itself a sphere of commercial and industrial activity. From Pangasnian in the north is drawn a principal part of the sugar sent to England and to Europe; and from thence, and from Ilocos, the indigo which is exported in Zebu, Iloilo, and the Southern Islands, is produced the sugar which chiefly supplies Australia; besides hemp, buffalo hides, and horns, tortoiseshell, wax, and sandal wood, for the markets of Europe and the United States, and from the rich provinces which crescent Manilla, the same productions are sent for export through the capital, while, independent of foreign trade, the northern division as the granary of the Philippines, and of China in its seasons of dearth, and Pangasnian as the chief ship-building province of the Philippines; and Iloilo, and the south, as manufacturing districts, of webs of much value, and articles of extensive native consumption, have resources of local trade, which enrich and animate their industry.

In the northern division there are in one of the two provinces of Ilocos six towns with populations in each of from 5,000 to 8,000, five towns with from 10,000 to 18,000, and one with 31,000 inhabitants, and in Pangasnian six towns with from 5,000 to 8,000, seven from 8,000 to 17,000, two with upwards of 21,000, two of 16,000, and one with upwards of 19,000.

In the southern provinces, Zebu has fourteen towns with from 5,000 to 10,000 inhabitants, and five with from 10,000 to 12,000, and in the Island of Panay, or Iloilo, there are thirty-two towns with from 3,000 to 8,000, seven with 8,000 to 10,000, thirteen towns with from 10,000 to 15,000, four of 18,000, one of 21,450, and another of 29,820.

The cheapness and quality of their produce, and the commercial tendency and situation of these possessions generally, cannot be better illustrated than by the facts that, unfostered by the Spanish authorities, and uninfluenced by Spanish enterprise, which chiefly is directed here to monopolies, Government contracts, and the carrying and coasting trade, and depending, therefore, chiefly for foreign supplies and native returns on native industry and foreign houses, the Philippines, while principally trading with England and the United States, extend their relations to China, the western coasts of North America, Australia, India, France, Switzerland, and Germany. Yet, notwithstanding the large proportion of commercial resources which are cultivated and are cultivable in the distant divisions of these possessions, notwithstanding the aggregations of population I have enumerated in those provinces remote from the capital, and testifying the existence there of commercial elements, and an industrial and commercial spirit, and notwithstanding that, for nearly five months in the year, those northern and southern divisions have alternately their commercial relations with Manilla, and

supplies of foreign manufacture, and exports of native produce suspended by the opposing monsoons, which impede nearly all navigation with them; the foreign trade of the Philippines is, at present, like that of Japan (though without being exclusive to one foreign nation) confined by law to the port of Manilla: here alone can come from abroad, to be discharged for distribution throughout these possessions, the manufactures of Great Britain and other countries, and here have to be brought from their remotest provinces, for purchase at Manilla by foreign merchants, every exportable article of native industry and produce.

The imports and exports have thus their natural expansibility compressed by the heavy charges of intermediate and unnecessary agency, shipments, storage, porterage, risks, insurance, and the interest of money, and wear and tear to which they are subject; and as the same restrictive spirit prohibits foreigners from going into the interior (even for mere purposes of recreation, except by special and charily conceded permission) our merchants here can do nothing to augment the consumption of foreign manufactures, by stimulating the caprices of provincial taste, and the produce they receive and send to their home markets they are obliged to take in the state (susceptible of much improvement) in which it may be brought to them. While a further restricting effect of the existing law, is that the provincial agency of manufactures and produce between our merchants and consumers is chiefly, and I may almost say entirely, conducted by a class of men, natives or of middle caste, individually with little capital, and credit in their relations with, and in the estimation of, the foreign houses here.

Home Correspondence.

COPYING PICTURES IN PUBLIC GALLERIES.

Sir,—Some pertinent remarks were recently inserted in the Society's *Journal* upon the practice of copying pictures in our public galleries, from which it appears that we are encouraging the growth of a class of copyists who make a livelihood by the multiplication of the most popular works, especially those of our modern painters. It is probable that permission to copy has been readily granted, and that the practice has obtained a footing without due consideration of the principles which it involves. They are, however, worthy of the examination of the Society of Arts, which is now at work to secure to artists a well-defined parliamentary title in their productions.

The National pictures in Trafalgar-square are open to the public for four days in each week; and on the remaining two days "to students only." The works of the painters of our own school at South Kensington are under the same control, and are subject to the same rule, except those constituting the treasured gift of Mr. Sheepshanks, which are under different management and regulation. The public thus gives up the enjoyment of its Art Galleries for two days in every six, for the benefit of Art Students, and, further, the public provides the Art Student with every facility, in its well-warmed and lighted galleries, on the two days devoted to his use. The public has therefore every right to inquire whether this sacrifice of its convenience and its money really tends to the promotion of art, by the education of the true artist, as well as whether any interests, public or private, may suffer by the unrestricted privileges which have been granted.

First, as to the practice of copying, as a necessary part of the Student's Art training. After an initiatory course of drawing, he has to learn, with the use of his palette and pigments, the different processes of painting—and for this purpose it is of great value to him to have access to works of good art, in which the manner of painting finds its best exemplification. In copying or extracting from these for from six to twelve months, the industrious student usually finds that he has mastered the materials and the processes of his art, and he is eager to test them in the trial of his inventive powers. He still visits the Galleries of his own, and, if within his reach, of foreign countries, not to make copies, but to store his mind and his note-book, and to feast his instructed eye in all that art has produced—the invention and grace of one master—the composition and style of another—the colour and harmony of a third—in fact the different excellences of each. If he copies it is only to possess himself of some prized remembrance, usually only the portion of a picture, as a delight and an example. This is the mode and limit of copying prescribed to a Student of the Royal Academy, and that which has been recommended by all the great teachers of art.

Secondly—But this is not the practice followed in our National Gallery. Your correspondent, whose remarks are verified by observation, shews that those admitted to study—"Students"—abuse their privilege—that they make innumerable copies of the same picture, which are not for the purpose, and cannot serve the purpose, of study, but are made for sale and are sold. And the best experience proves that these hackneyed copyists—I do not wish to use the term offensively—never become artists, that from indolence or inability,—frequently the former—they fail entirely in that invention which constitutes art—and become *habitués* of the Galleries—mere copyists, pirating the thoughts of others, but artists never.

The public then sacrifices its convenience and its money, and fails in the promotion of art, an object doubly precious in a great commercial community. On the other hand, may not art suffer by the diffusion, under the existing system, of numerous bad and hasty copies of fine works made to sell, and, in the possession of the unscrupulous, likely to become objects for imposition? Is this fair, either to the interests or feelings of the cotemporary artist, sensitive in all that relates to his works, or to the memory of those who have passed from us? Should their cherished labours be subjected to such a use? It is the natural penalty of all great inventors to be followed by herds of imitators—but it has remained to the present day to deliver over to the mercenary copyist the works of our living painters. Hitherto an artist has been usually and properly consulted as to the mode of engraving his works even, and he has always felt much delicacy himself in making a replica of a picture which has passed from his own possession.

If these premises are well-founded, then it behoves the Trustees of our National Gallery to make some change in their regulations—both in the interests of the public, the art-student, and the artist. It would go some way towards a more wholesome state of things, if the Trustees were to restrict the permission to copy to young students in art, and to a term of six months, to be renewed for a further term not exceeding six months, on a satisfactory report of the use made of the first term—and to all other persons, to limit the permission to the one particular picture which may be the object of the request. The restriction ought, however, in justice to the living artist, to be carried further, and his works, except with his sanction, be prohibited to the Copyist, to whom the works of the old masters afford the best examples of every mode of execution.—I am, &c.,

S. R.

ACCLIMATISATION OF ANIMALS.

Sir,—In Mr. Buckland's interesting paper on this subject, one or two points appear to have been overlooked by the author, and also by the gentlemen who addressed the meeting after the paper.

In submitting these thoughts to your readers, I would not be understood to speak more than suggestively, for although they are true so far as my individual limited experience goes, and may be capable of enlargement in the same sense, they may, on the other hand, be accounted for on quite other grounds by more extended observations.

I conclude the following to be general laws:—

1. That the most delicate-eating fish are found in temperate latitudes.

2. That fish either wholly inhabiting, or occasionally visiting the sea, are most appreciated as human food.

3. That as we advance to more tropical regions, river fish take the place of sea fish as articles of diet.

Assuming these statements to be correct, to even a limited extent only, they may be worthy of consideration by the Society, to temper too sanguine expectations that might be raised of the result of introducing new species of fish into some of our colonies. As we get into warm latitudes, and approach the tropics, we soon become conscious of being in the presence of monsters of prey, both of the fish and reptile class.

I would moot, then, as a subject of inquiry, the question whether the delicate flavour of our northern fish, cod, salmon, &c., is not in some measure owing to the repose in which they exist, as compared to those fish which live in a condition of violent persecution. I presume it may be taken as a fact that most, if not all, fish obtained where sharks abound are comparatively dry, tough, and without flavour. On Darwin's principle this would probably be explained by stating that, in the struggle for existence, the weak, heavy, flesh-forming fish are devoured by their more voracious brethren, and only the more muscular kinds are able to maintain their position. In the rivers of warm countries the fish pass their existence in a state of greater repose than their sea congeners, and hence perchance the reason why such fish develop more flavour and are selected for the table.

It would seem, therefore, highly important, before estimating the result of any endeavour to introduce our fish into some of our colonies, to take into the calculation the probable effect of their exposure to attacks from new and vigorous enemies, as well as the difficulties of becoming accustomed to new conditions of existence, both as regards climate and procuring food and safe gratification for their migratory instincts, whether for spawning or feeding. In addition to noticing the prevalence of sharks, dog-fish, &c., which abound in warm climates, I may say that the rivers of Australia, referred to by Mr. Buckland, have a more sluggish character than those to which the salmon are accustomed, and I have some doubts whether, except in Van Diemen's Land, the salmon would readily accommodate itself to its new home. The south portion of New Zealand affords a character more similar to its native habitat, and as the southern province of that colony is principally tenanted by Scotchmen, it would be welcomed, and every facility afforded for its introduction and propagation by persons conversant with the fish and its habits.

On the general question of introducing animals into this country, I would remark that, although venison was highly prized at one period in comparison with other food, the modern improvements in the quality of our beef and mutton should not be overlooked, by which the strong comparison to their disparagement which probably once existed no longer obtains; however, for the sake of varying the rotation crop of flesh dinners, it is desirable to introduce an animal of the deer tribe, if its breeding can be rendered as profitable to the grazier as the present domestic animals, but only for the sake of variety, as the deer eats the same description of food as the sheep and ox, it consumes food which is equally and profitably eaten by them; and it is a question of substitution of one animal for another more that one of addition.

As a rule, it appears to me that all wild or semi-wild animals, as the deer and goat, must give way, when land becomes enclosed and cultivated, to the more domesticated animals; goats are disappearing, even in places which seem peculiarly fitted for them, before sheep, although goat and kid are not at all objectionable, at least I have grateful recollections of these viands; hence the changing and progressive circumstances of cultivation must be borne in mind before the mere introduction of new forms of herbivora can be considered of permanent value. It must be shown that the cost per head will not exceed that of an equivalent number of sheep or oxen, and that the result will be as profitable.

To any one conversant with the kangaroo, it cannot be deemed more than theory to advocate its introduction, unless a system of stall-feeding can be shown to be profitable, and more so than an equal weight of beef. The keeping of kangaroos in herds in this country I cannot conceive. As, however, we can more readily import grain and vegetable food than living animals, some great good may be done by earnestly carrying out reasonable experiments. Our fields being tolerably well occupied by oxen and sheep, the most profitable and useful to man of all vegetable-feeding animals, unless we ignore the experience of all ages since the creation, there is not, therefore, much hope of superseding them advantageously; but probably there may be numerous animals which, like the rabbit, would live and thrive as well in confinement as in the fields, and these might possibly be introduced with reasonable hopes of adding to our resources for animal food. Nor should our friends be daunted by want of immediate success; it frequently requires a long time for the taste to appreciate unaccustomed articles of diet, and a new dish should seldom be introduced by direct name, but rather as something recommended by the cook; thus a march is stolen upon prejudice. That tastes may change, I could give numerous curious proofs; suffice that on one occasion I was present at a dinner party, when attention was called to the fact that six persons were partaking, by choice and with relish, of a dish which they had all declined as unpalatable only twelve months before.

In offering the preceding remarks, I have had no desire to damp the ardour of experimenters; my object has been more to suggest the limiting of exertions to the probable, than the allowing energy to be wasted on what may simply be possible.

In conclusion, it may not be unworthy of notice, as characteristic of our neighbours, that neglecting the improvement of their own terribly bad beef and mutton, a commonplace practical matter, they grasp at the ideal of peopling their scantily supplied country with novel forms of animal life.

I am, &c.,

WILLIAM STONES.

Dec. 18, 1860.

MEETINGS FOR THE ENSUING WEEK.

Tues. ...Royal Inst. 3. Professor Faraday, "On the Chemical History of a Candle."
Pathological, 8. Anniversary.
Photographic, 8.

Wed. ...Pharmaceutical, 8.
Ethnological, 8½.

Thurs...Royal Inst. 3. Professor Faraday, "On the Chemical History of a Candle."
Zoological, 4.

Fri. ......Archæological Inst., 4.

Sat. ...Asiatic. 3.
Royal Inst. 5. Prof. Faraday, "On the Chemical History of a Candle."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, December 7th*, 1860.]

Dated 4th December, 1860.

2977. G. F. Stidolph, Ipswich, T. Simpson and J. R. Morley, Woodbridge, and J. Stidolph, Ipswich—Imp. in the construction of crates and other packing cases.

2979. J. B. Payne, Chard, Somersetshire—Imp. in machinery for the manufacture of fishing and other nets.

Dated 5th December, 1860.

2981. G. W. Hart, 9, Stanley-terrace, Southsea—Imp. in the embrasures of fortifications, and in the portholes of ships of war.

2983. C. W. Lancaster, New Bond-street—Imp. in sights for rifles and other fire arms.

2985. E. Morewood, Enfield—Imp. in coating metals.

2987. G. C. Lingham and J. Nicklin, Birmingham—Certain imp. in belt-fastenings, and which said improvements are also applicable as a connector for brace-fronts, garters, and other articles of dress

[*From Gazette, December 21st*, 1860.]

Dated 6th September, 1860.

2150. C. A. Schneider, 9, Albany-street, Regent's-park—Imp. in manufacturing letters, numerals, arms, designs, trade-marks, mosaic and other ornaments to be attached to glass or other smooth surface.

Dated 22nd October, 1860.

2572. A. Dietz, New York, U.S.—A new and useful method of treating skins and hides during or after the process of tanning or finishing them, and of aiding the tanning of hides and skins.

Dated 26th October, 1860.

2614. R. Tiernan, Liverpool—Imp. applicable to infants' and invalids' feeding bottles, and other purposes.

Dated 2nd November, 1860.

2690. W. E. Newton, 66, Chancery-lane—An improved press for compressing substances for packing in the form of bales, or for other purposes. (A com.)

Dated 9th November, 1860.

2748. J. P. Fittère, Castelnau Magnoac, France—Imp. in portable sawing machines.

Dated 16th November, 1860.

2812. J. C. M. Béziat, 51, Rue de Malte, Paris—Imp. in the means or apparatus employed for permitting, stopping, and regulating the passage of steam, water, and gases.

Dated 17th November, 1860.

2831. A. L. Léveque, Paris—An improved apparatus for carburating or naphthalising lighting gas.

Dated 22nd November, 1860.

2864. R. A. Brooman, 166, Fleet-street—Imp. in apparatus for communicating continuous rotary motion from manual power. (A com.)

Dated 23rd November, 1860.

2870. W. Manwaring, Banbury—Imp. in the gearing of mowing and other light portable machines.

2872. J. Coupe, Blackburn—Imp. in power looms for weaving.

2874. B. Beniowski, Bow-street, Westminster—Imp. in the manufacture of types and in cases to be used therewith.

Dated 26th November, 1860.

2892. J. W. Hadwen, Kebroyd Mills, Halifax—Imp. in the treatment of silk waste, waste silk, or silken fibre, and in the manufacture of yarns and tissues for the same, whether alone or in admixture with other materials.

Dated 27th November, 1860.

2908. W. S. Wood, Chislehurst, Kent—An improved arrangement of apparatus for curing smoky chimnies, and for ventilating purposes.

Dated 28th November, 1860.

2920. H. Grafton, 80, Chancery-lane—Imp. in the application of machinery to the cultivation of land.

Dated 29th November, 1860.

2935. J. A. Fenshaw, and J. A. Jaques Tottenham—Imp. in brushes and other scrubbing and rubbing surfaces.

Dated 1st December, 1860.

2945. R. Dawbarn, Wisbech, Cambridgeshire—An apparatus for stopping rents or holes in fire-engine hose and other elastic tubes or pipes. (A com.)

2952. J. Ronald, Liverpool—Imp. in machinery for the spinning of hemp, flax, manilla, or wool, or other like fibrous materials.

2954. T. Shedden, Ardgarton House, Argyle, N.B.—Imp. in ammunition for fire arms, and in packing the same for transport, and in the apparatus employed therein.

Dated 3rd December, 1860.

2960. W. Galloway and J. Galloway, Manchester—Imp. in steam boilers.

2962. W. R. Barker, Chapel-street, Belgrave-square—Imp. in bottles for medicines and poisons.

2964. J. Lowden, and R. Buckley, Royton, Lancashire—Certain imp. in carding engines.

2966. J. T. Carter, and J. Austen, Sydenham—An improved method of roughing horse shoes.

2968. T. Whitehead, Holbeck, Leeds—Improved machinery for combing wool, hair, flax, tow, cotton, silk, and other fibrous substances.

Dated 4th December, 1860.

2974. F. Jaques, Droylsden, near Manchester—Imp. in or improved apparatus applicable to rifled or other muskets, and to other fire-arms.

2976. R. Griffiths, 69, Mornington-road, Hampstead-road—Imp. in screw propeller blades.

2978. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the construction of clothes dryers, or folding racks for airing and drying clothes.

2980. C. S. Duncan, Hereford-road North, Bayswater—Imp. in the construction of electric telegraph cables or ropes.

Dated 5th December, 1860.

2984. G. Hallett, 52, Broadwall, Lambeth, Surrey—Imp. in coating iron and other ships' bottoms, and other surfaces.

2986. B. Gorrill, Birmingham—Certain imp. in the making of gilding tools, for gilding or embossing ornaments on leather and other surfaces.

Dated 6th December, 1860.

2989. H. Jordan, Liverpool—Imp. in the construction of ships or other vessels.

2990. J. F. Pratt, Oxford-street—Imp. in instruments for receiving or transmitting sound, particularly adapted to the relief of deafness.

2991. R. A. Glass, Greenwich, Kent—A method of and apparatus for preserving electric telegraph cables and wires prior to their being laid.

2992. M. Deavin, Rotherhithe, Surrey—An improved apparatus applicable as a fire-escape, also to the raising and lowering of weights.

2993. T. Mellodew, Oldham, C. W. Kesselmeyer, Manchester, and J. M. Worrall, Salford—Imp. in the treatment of velvet, velveteens, and other fabrics on which there are floated weft threads to be cut.

2994. J. Bellamy, Wednesfield, near Wolverhampton, Staffordshire—Imp. in traps for taking rats, birds, rabbits, and other animals.

Dated 7th December, 1860.

2995. J. Musgrave, Bolton-le-Moors—Imp. in apparatus for regulating the discharge of water from steam pipes.

2996. J. C. Haddan, 14, Bessborough-gardens, Pimlico—Imp. in the manufacture of cannon, and of projectiles, part of which improvements is applicable to casting metal.

2997. P. Guerin, Cluny France—Imp. in the hydraulic press.

2999. F. H. Edwards, Newcastle-upon-Tyne—Imp. in air engines.

3000. S. Holman, Lewisham, Kent—Imp. in machinery for communicating motion to and transmitting motion from reciprocating rods.

3001. J. B. Tuttle, 93, Minories—Imp. in the means of communicating signals, applicable to naval, military, and railway purposes.

3002. W. Clark, 53, Chancery-lane—Imp. in machinery for planing or cutting wood, and in apparatus connected therewith. (A com.)

3003. J. J. Wheble, Reading, Berkshire—Imp. in the manufacture of artificial stone for building purposes.

3004. B. G. George, Hatton-garden—Imp. in the mounting of tablets or show bills, and also of prints and drawings.

3005. T. Foxall, Princes-street, Fitzroy-square—An improved canteen or case for obtaining refreshments for soldiers or travellers.

Invention with Complete Specification Filed.

3105. C. Stevens, 1a, Welbeck-street, Cavendish-square—An improved cooking stove. (A com.)—18th December, 1860.

Patents Sealed.

[*From Gazette, December 21st*, 1860.]

December 21st.

1516. H. Palmer & H. S. Swift.
1526. R. A. Brooman.
1536. P. Pailleron.
1542. G. Davies.
1543. W. Routledge.
1546. W. Hooper.
1559. M. J. L. Latta.
1561. J. C. Evans.
1562. W. H. Fletcher.
1566. J. Blakeley and W. H. Blakeley.
1567. C. Bosselaers.
1569. W. Campion and W. Campion.
1578. W. Hale.
1584. T. Cox, jun., R. Harrington, and W. Holland.
1586. R. Laming and C. Smith.
1588. C. P. Gontard.
1634. W. Grimshaw.
1674. J. Jack.
1720. W. Birks, sen., and W. Birks, jun.
1734. J. Goulson.
1740. R. Oxland.
1804. H. C. Ash.
1810. H. Jackson.
1858. W. Pickstone.
2128. T. Grimston.
2348. M. Jacoby and J. Stones.
2468. R. Hornsby, jun.
2544. A. V. Newton.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, December 21st*, 1860.]

December 17th.

3095. M. J. Turner and M. W. Turner.
3113. J. M. Napier.
3114. R. Oxland.
3118. R. Furnival.

December 18th.

3121. R. A. Brooman.
3175. J. Cottrill.
4183. E. Gomez and W. Mills.

[*From Gazette, December 25th*, 1860.]

December 20th.

3136. W. Beresford.
3137. A. R. le Mire de Normandy.

December 21st.

3177. I. Holden.

December 22nd.

3150. A. F. Kynaston.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, December 21st*, 1860.]

December 19th.

48. R. Husband.
60. A. Drevelle.

[*From Gazette, December 25th*, 1860.]

December 20th.

3022. A. V. Newton.

December 22nd.

2985. F. Bennoch.
3000. T. S. Prideaux.

Journal of the Society of Arts.

FRIDAY, JANUARY 4, 1861.

EXAMINATIONS.—LOCAL BOARDS.

Those Secretaries of Institutions who have not forwarded Lists of their Local Educational Boards are requested to send them as soon as possible.

PRIZE FOR AN ESSAY ON MARINE ALGÆ.

The 31st December, 1860, being the last day for the reception of Essays in competition for the Prize of £100, placed at the disposal of the Council by Sir W. C. Trevelyan, Bart., the Secretary begs to announce that two Essays have been received, bearing the respective mottoes of "Humilitas" and "Spes."

INTERNATIONAL EXHIBITION OF 1862.

The Cape of Good Hope *Gazette* announces that his Excellency the Governor of that Colony is desirous that the products of the Cape of Good Hope should be properly exhibited at the ensuing International Exhibition, to be held in London in 1862, feeling convinced that great benefit will result from a knowledge of the natural resources of the Colony being extensively disseminated. His Excellency has therefore appointed the under-named gentlemen to form a Commission to deliberate upon the best means of carrying out this design, and trusts that they will meet with the support and co-operation of all classes of Her Majesty's subjects in South Africa:—The Hon. R. Southy, Acting Colonial Secretary; the Hon. W. Porter, Attorney-General; Hon. W. S. Field, Acting Collector of Customs; Sir Thomas Maclear, Astronomer Royal; L. Pape, Esq., M.D., Colonial Botanist; Sir W. Hodges, Knight; and Messrs. P. B. Borcherds, T. B. Bayley, E. Laidesberg, J. R. Marquard, C. Mumick, E. J. Jerram, S. van Reenen, R. H. Arderne, R. Hare (Groenefontein), J. C. Gie, and R. W. Murray; Committee of the Cape of Good Hope Agricultural Society—Messrs. F. W. Reitz (Swellendam), T. C. Bourhill (Caledon), J. C. Molteno (Beaufort), J. Rainier (Malmesbury), J. J. Proctor (Paarl), J. H. Memnick (Tulbagh), J. Brand (Clanwilliam), W. Walters (George), C. Manuel (Bredasdorp), R. Le Sueur (Worcester), delegates of the Western Districts named after each; and Messrs. T. Ansdell, J. Eustace, J. Sheppard, R. Clarence, and E. Macgibbon.

THE PRESERVATION OF FOOD.

By Rear-Admiral Sir Charles Elliot.

Judging from the public notices on the harvest, there seems little doubt that all kinds of winter support for cattle and sheep have fallen short. If that should prove to be the case, or whenever it be so, it is clear that effective means of making those stocks go farther, must be more advantageous in proportion to the intensity of the pressure.

My present object however, is not to consider the accuracy, partial or complete, of these reports, but to claim attention to the fact that meat may be preserved in carcase in this country, between the middle of November and the early part of May, as it is in Russia and in Canada, and, indeed, as it is here (without any artificial appliances) in seasons of protracted frost, for periods of considerable duration. It has, no doubt, happened to many of us to partake of a saddle of mutton in the depth of a hard winter, which had been hung up in a friend's larder for upwards of a month, not only without the least taint to the meat, but, on the contrary, to its great improvement.

There is, in fact, no difficulty in subjecting meat in carcase to the exact condition of temperature, and necessarily of dryness requisite for its perfect preservation; and, it may be confidently added, that efficiently-constructed and well-fitted depots for the storeage of meat between certain points of reduced temperature during the winter months would be far less chargeable, troublesome, and hazardous of management than conservatories of delicate tropical plants necessarily maintained at a high degree of heat and humidity through every hour of that season so formidably trying to such productions. I have eaten of a turbot at Barbadoes (taken on the coast of England more than three weeks before), with the thermometer at a tropical range for at least six previous days, in as fine condition as I ever tasted the fish in London. Mr. Alderman Mechi, to whom I mentioned this fact, remarked to me that it did not surprise him. He had eaten of salmon taken out of a river in Scotland on the same day, which he thought could not be compared in point of excellence with salmon taken out of an ice basket that had probably lain in London for several days, or it might be weeks.

Professor Hofmann, with whom I have conferred on this subject, observed to me that the point for consideration is not whether meat can be perfectly preserved in carcase for indefinite periods under certain conditions of reduced temperature, for that is indisputable, but whether it would be cheaper, and otherwise more advantageous, to keep the meat in carcase from the moment the animal is in a fit condition to be slaughtered, at the least outlay for food. He thought that it was very probable that may prove to be the case, and strongly encouraged me to pursue the subject.

If we suppose that a grazier, in a situation to send to market, one season with another, twenty head of cattle and 100 head of sheep in prime condition for the butcher, should be henceforth furnished with the means of storing that quantity in carcase in all the month of December, with the assured knowledge that the meat could be kept and moved to market in that state of good condition throughout the ensuing four months, it is plain that his capabilities to rear stock would be well-nigh doubled. But what is true of one farm in such circumstances is true of vast breadths of land appropriated to the growth of winter food for cattle under similar conditions of security of deposit and transport to market in prime condition. With our insignificant distances of navigation, and great and increasing facilities of rapid transport, by water and land, it is easy to secure any conditions of temperature requisite for the perfect preservation of the meat, in transit, not merely in winter, but in the hottest season of the year.

What the difference would be in years of average crops between the charge of maintaining the beasts alive and of storing their carcases under effective conditions of reduced temperature, for equal periods, would of course depend upon the economic soundness and practical skill of these last arrangements. At all events, I hazard nothing in saying that, even in years of most abundant crops there would be a large margin in favour of the storage system. It is manifest that it must in all cases cost much less to keep meat cold and fresh during the winter months, when the conditions of natural temperature are favourable to such objects, than to make and keep beasts fat in the same season, when cattle food must be most expensive, and it must need much more of it to nourish the animals than in the spring and summer months.

In point of principle, it is incontestable that cattle, sheep, and hogs should never be driven one foot farther than may be necessary to transport them to positions where they can

be put into carcase, and conveyed more economically, by land or water, under proper securities for the preservation of the meat in prime condition.

Adverting to the great and increasing cattle trade between Ireland and Great Britain, it has occurred to me that the most eligible mode of accomplishing the purposes in view would be to establish great abattoirs, with properly-constructed and efficiently-cooled depots attached to them, at the principal ports of export, as well as establishments of the same kind at the opposite termini of the lines, and at stations along them contiguous to the great grazing districts of the country. But it would be obviously impossible to make such arrangements at every point of the lines at which cattle are received for transport. The best thing to be done, therefore, as it seems to me, would be to establish branch depots at judiciously-selected positions on the lines, such, for example, as the sites of great cattle fairs and markets, concentrating at these points effective means for slaughter, storeage, and transmission of the carcases from time to time to the depots of export, as well as for utilising all the other merchantable products of great abattoir establishments, and for restoring to the soil in the fittest condition, at the least loss of time, and least cost, all that portion of the results which serve as manure.

Reflecting on this subject as I passed through Ballinasloe a few weeks before the large annual fair, it struck me that it would be an excellent position for such an establishment as had suggested itself to my mind, of course in connexion with proper storeage and forwarding depots at the great ports of export. Assuming that the whole organisation had been carried out by the suitable equipment of air-tight tanks in the steam-ships for the safe conveyance of the meat, and in the waggons on the rail (to be maintained at a temperature rather below the freezing point), it would scarcely be too much to say that the economy effected of immense stocks of expensive cattle food and in reduced freight would probably not be less than the whole amount of money which the graziers had received for the beasts they had brought up to that fair.

The above remarks refer entirely to the cattle trade between Ireland and Great Britain, but if they are sound as respects that trade, it is clear that they are equally so of the storage and transport of meat by land or water in all countries possessing the necessary pervasive facilities of rapid land and water locomotion.

The time, I believe, is not distant when the great abattoir establishments of centres of large consumption, with all their mischief sanitarily considered, temptation to intemperance and vice, and waste of valuable resource, will be replaced by great central and district depots for the storeage of meat, fish, poultry, and all fruits, vegetables, and other alimentary products to which scientific and systematic modes of maintaining them at the necessary degree of reduced temperature can give prolonged subsistence without deterioration.

An important effect of the successful adoption of this system for the storeage and transport of meat would be to extend to it the solidity of other great staples of consumption as a basis of commercial and financial security. Sugar, for example in depot, is subject to much more of waste than would be the case with meat under the conditions here contemplated, but sugar finds its way to consumption under much steadier circumstancess both for buyer and seller, than meat under the present hand-to-mouth conditions of supplying and clearing the market according to all the variations of the temperature and fluctuations in the cost of cattle food. It frequently happens, I am told, and especially at the season of Christmas, Easter, Whitsuntide, and Michaelmas, that immense stocks of the finest descriptions of meat, poultry, game, &c., collected at the great centres of consumption, are suddenly thrown upon the market, and sacrificed at a heavy loss in consequence of a sudden change of temperature. But if effective depots existed for the safe keeping of these valuable supplies, that would not happen. Capitalists engaged in those branches of trade would purchase for storeage in all such cases of immediate over-supply, to the great relief of the holders (usually persons of small means) and of the public.

If we advert for a moment to the enormously high prices of cattle and sheep fodder in the winter and spring of the current year (and it may be added that the prospects of the present winter are not encouraging in these respects) we shall indeed be struck with the immense public advantage of an effective system for the storeage and transport of meat such as I have endeavoured to explain above. In some parts of the North of England and Scotland, where I chanced to be residing at that time, the pressure on the cattle was most distressing. Many farmers, I was credibly informed, were compelled in the lambing season to kill the lambs to save the mothers, owing to the almost total failure of the carrot crop; and a friend of my own, who farms with great success on a large scale in Westmoreland, at several miles distance from a railway, told me that, in the very tardy spring, it would literally be cheaper for him to feed his stock on wheaten bread than on hay at the price for which he could then purchase it. Some millions sterling would have been saved to the public wealth in the economy of cattle food, in the price of meat, and in the consequences on the general trade of the country of an unusually high price of provisions throughout the winter and spring, if large stocks of the cattle intended for slaughter in the ensuing four months could have been put into carcase in the month of December, 1859, under such conditions of safe storeage and transport to market as I am convinced are susceptible of steady establishment.

Most economic writers have noticed the great difference observable in the genius of invention and improvement in commercial and manufacturing processes, and in all the labours and operations which have the nourishment of man for their object. It cannot be denied, at least, that our present situation in all that concerns the preservation and transport of our animal food, is forcibly corroborative of that remark. In these respects we are still in a very backward, not to say a barbarous, state of civilisation. No man of observation can visit one of our great cattle markets in large cities, or attentively examine the condition of the beasts during the voyage from Ireland, or in closely-packed cars on long journeys, without being struck by the humiliating juxtaposition between great and growing advancement in the decencies and conveniences of life and revolting proofs of unnecessary violence, too often of savage cruelty, and always of deterioration of the meat, and superfluous expense, which are the results of our present modes of fulfilling this great requirement of our existence.

I do not enter into any detailed explanation of my own ideas of constructing and organising the service of the depôts, or on the fitting of the vehicles or tanks of transport, either by land or sea, so as to secure the necessary conditions of temperature and cleanliness, because I am, of course, sensible that my views must be very susceptible of improvement. There is great room for ingenious scientific adaptation in these respects, and it is plain that these means cannot reach their highest points of simplicity, effectiveness, and economy, at once.

Amongst the persons with whom I have communicated on this subject is Mr. Daniel Siebe, the talented and skilful constructor of the machine for making ice on an extended scale by the ingenious process conceived by Mr. James Harrison, of Australia.* These two gentlemen have succeeded in producing a perfectly effective machine, driven by a ten-horse engine, capable of making 8,000lbs. of ice in twenty-four hours, at an expense (in London), including interest of money and every working charge, not exceeding ten shillings per ton, which I believe I am correct in saying, is at least fifty per cent. cheaper than the ice can be landed on the wharves of this river from abroad.

They have further placed us in possession of simple,

* For a description of this machine see *Journal*, Vol. vi., p. 475.

efficacious, and inexpensive means of greatly reducing, as well as regulating, the temperature of apartments of considerable area, in tropical climates, as, for example, barrack-rooms, the wards of hospitals, courts of justice, prisons, &c.* It is much to be wished that her Majesty's Government, and more especially the Indian branch of it, may direct their early attention to this subject. The invention is of high interest, and susceptible of adaptation to a variety of important uses in the public establishments of the country with great advantage and economy. My service has been principally within the tropics, and I may therefore take this opportunity of stating that this machine is well worthy of the careful examination of reflecting persons publicly or privately connected with our possessions in low latitudes. Mr. Siebe's manufactory is No. 17, Mason-street, Westminster-bridge-road.

This whole subject appears to me to recommend itself to the particular attention of the corporations of large cities, of the Chambers of Commerce of the chief ports of cattle export and import, and of the directors of the main lines of railway in Ireland and in England. It seems probable that the best mode of carrying out such projects would be by means of joint-stock companies, and I am strengthened in that impression by the opinions of persons of practical ability with whom I have conferred on the matter. But, at the same time, if this extended scheme should not immediately recommend itself to the public, there is good ground for the belief that the independent adoption of well-devised plans of the kind by proprietors of large estates in grazing districts, conveniently situated in the close neighbourhood of large cattle fairs or markets, as well as of railway stations, would be attended with handsome profits to the parties themselves, and substantial advantages to the surrounding country.

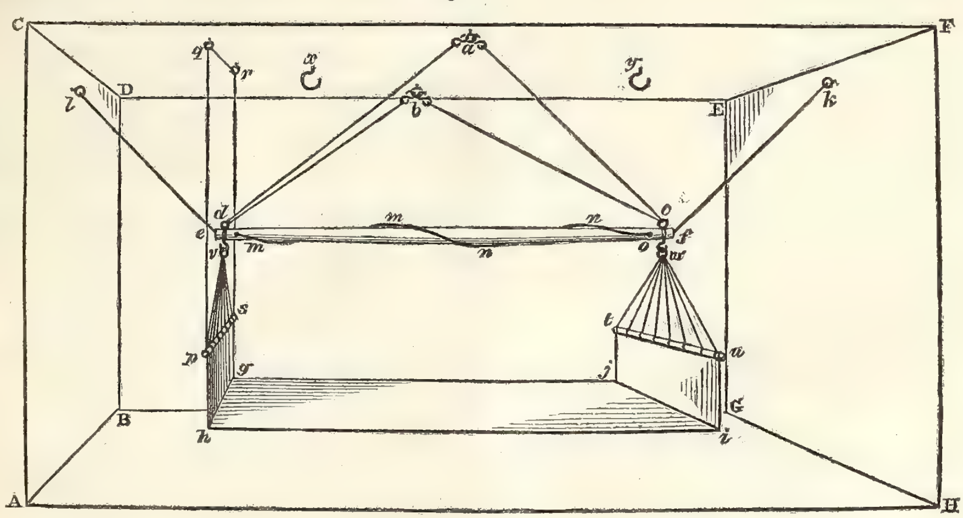
31, Kensington-park Gardens, W., Nov. 15, 1860.

SWING COT FOR SEA VOYAGES.

By Sir J. F. W. Herschel, Bart., F.R.S.

I beg to submit, for the consideration of the Society of Arts, the following mode of suspending a cot on shipboard where a whole cabin is disposable as a sleeping apartment (the cot being removable in the day time), as having, from experience in a voyage to the Cape and back, found it productive of a degree of comfort far surpassing any of the ordinary arrangements of swing cots or beds on jimbals which I have seen adopted; affording an invalid, in the roughest weather, the most complete immunity from all the ordinary causes of complaint arising from the pitching and rolling of the vessel, and entirely obviating any tendency to sea-sickness. Its principle is the reverse of free or jimbal suspension, and relies on friction as a

Fig. 1.



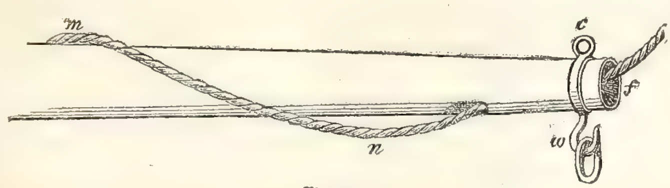


Fig. 2.

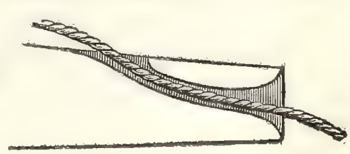


Fig. 3.

means of deadening oscillation. As the figures annexed will speak for themselves, no lengthened description will be needed; and I will only add, as regards expense, that it may be fitted up by any ordinary carpenter and blacksmith at the cost of a very few shillings.

Fig. 1 is the interior view of a cabin with the cot, *g h i j*, suspended by the clews, *v p s t u w*, from the hooks, *v w*, at the end of the cot-pole, *e f*, which is itself suspended by cords or light iron rods *ac*, *bc*, *ad*, *bd*, of precisely equal lengths (when equally stretched), and which (if cords) are firmly knotted (so as not to run) to the rings, *c d*, on the

* A large provision-merchant at Hamburg, in the course of last summer, experimentalising on this plan, merely by way of trial, and with incomplete arrangements, succeeded in reducing the temperature, in about two hours, from 80 deg. to 40 deg Fahr. The apartment was seventy feet long by twenty-five wide. The expense was trifling, consisting of some feet of pipe (four inches in diameter) and a few pounds of ice and salt.

upper side of the pole, and are furnished with hooks at their upper ends, *a b*,* attachable when in use to rings screwed on the starboard and larboard side of its medial line, or right athwart ship, into the ceiling of the cabin, the planes of which should be adjusted fore and aft. The cot-pole should lie exactly horizontal, and truly fore and aft when the ship is at rest, and the lengths of the cords or rods, *ac*, *bc*, *ad*, *bd*, should be adjusted accordingly.

l e m m n n o f k is a friction band (cord is better than woollen list, which creates too much friction), attached by loops, *k l*, to the fore and aft walls of the cabin, and passing into, through, and round the cot-pole in the manner represented in fig. 2 and fig. 3; the latter being a section, through the axis, of one end of the cot-pole, showing the channel through which the friction-band enters and emerges at either end. It is needless to remark that all this part of the work must be smoothly rounded to avoid cutting the band.

p q r s is a stout pack-thread attached to the cot at the foot, at *p q*, and passing through rings *q r*, screwed into the ceiling; the pack-thread being so tightened by trial as to destroy, by its friction on the rings, the effect of the ship's roll, as the friction band, *l m n k*, effectually does that of its pitch.

The figures are on no precise scale, which must depend on the dimensions of the cabin. The cot should hang about a foot from the floor, and the height of the pole should be adjusted accordingly. But every part here figured is essential to the well-working of the concern, and ought on no account to be departed from by the workmen employed to construct it.

In the day time, the cot may be removed, and stowed away as usual, and the cot pole put out of the way on the hooks, *x*, *y*, under the ceiling, with the line rolled round it. When the bands wear they are easily replaced by new ones.

I venture to recommend the principle here employed (the quieting of oscillations by friction, in lieu of perpetuating them by the usual modes of free suspension) with proper adaptation to the special case, for hanging ships' barometers; for suspending a chair for telescopic observation at sea (for which a stiff rope or end of cable *fixedly* attached at the upper end might be worth trying); for swing trays, lamps, &c., on shipboard.

Collingwood, Dec. 18, 1860.

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS.

(*Continued from page 92.*)

Sugar from Siam.—Siamese sugar may be imported into the United Kingdom as free grown. It is much esteemed for its whiteness and fine strong grain, and as the greater portion of the valley of the Menam, the area of which has been estimated at 22,000 square miles, is reported to be well adapted to the growth of the cane, it would appear that the cultivation, unless checked by indolence on the part of the people, or illiberality in the measures of Government, would readily admit of a very material increase.

Salt, of excellent quality, is obtained from the extensive mud flats which line the head of the Gulf of Siam, and at so cheap a rate, that the cost of production does not exceed from 2s. 6d. to 5s. for 3,4000 lbs. English. But in Siam, as in many other countries, salt has been selected by the Government as a special object of taxation, and the duty there amounts to from 12s. to 14s. per ton.

Hemp.—The growth of hemp in Siam is only just becoming known. It is particularly recommended on account of its great strength, and its glossy and silky texture—which would allow of its being woven up into silk fabrics. Its price is about 25s. per pecule, which will enable it to compete successfully with that of Manilla.

Antimony.—Large quantities of antimony ore have been discovered at a short distance from Bangkok (Siam.)

Green Marble.—The Valley of Papenoo—the largest and deepest in the Island of Tahiti—affords specimens of pebbles, as well as blocks of lava, of felspar, of amphibole, and pyroxenes, analogous to the dionites and diorites; moreover, there are to be found masses of a green rock susceptible of a high polish and resembling serpentine.

Coal.—Coal is procured at the settlement of Nanaimo (Vancouver's Island), where the Hudson's Bay Company have made a large purchase of land and commenced an extensive coal work. Two valuable beds of coal, varying from five feet to seven feet in thickness, are found within 100 feet of the surface; the coal is bituminous and is greatly prized for domestic consumption and for steaming purposes. The produce of these works may be increased, by increasing the number of hands, to any desirable extent.

Ship Spars.—A source of wealth and enterprise may be found in the magnificent ship spars produced in Vancouver's Island, which, in point of size and comparative strength, are probably the most valuable in the world, and may be procured in any number, even were the demand to include the supply of spars for the whole British navy. A company was formed in this country for the exportation of ships' masts and spars to England; but the parties finding that they had not a sufficient command of capital for the undertaking, discontinued the business, after preparing two cargoes of excellent masts, ranging from 75 to 120 feet in length, which still remain on hand.

Oil from Vancouver's Island.—The oil exported from this colony is procured from the native tribes inhabiting the west coast of Vancouver's Island, and is manufactured by them from the whale and dog-fish; it is of excellent quality, and has a high character in California, where it brings from two to three dollars a gallon, in consequence of its retaining its fluidity, and burning freely in the coldest weather.

It is estimated that a quantity equal to 10,000 gallons was purchased from the natives of the west coast in 1854; and considering the imperfect means they possess for taking the fish, and frying out the oil, it is not unreasonable to suppose that with the use of proper means, the returns of oil would be very greatly increased.

The oil trade is carried on by a few enterprising individuals who live among the Indians, and collect the article as it is manufactured by the natives.

Shea Butter is now being brought by the natives in considerable quantity from the interior of Africa, particularly from the southern banks of the River Niger, where the trees, bearing the nut from which this tallow is extracted, grow in great numbers, forming miles of forests. The value of this tree and its product has been pointed out to the natives by the officers attached to the Niger Expedition, some of whom have made frequent journeys between Lagos and their encampment near Rabba. Hitherto only very small quantities had been brought down to the coast.

Tin.—A tin mine has been discovered in Maluan Bay, Brunei (Borneo), but no steps have been taken to work it. Antimony is also reported in the neighbourhood of the capital.

Marble.—There exists near Tlemcin, province of Oran, Algeria, a quarry of translucid marble; and near the Cape de Fer, betwixt Philippeville and Bona, there is a quarry of marble, which resembles the white Ferrara.

Raw Sugar from Beetroot, manufactured at Dunkirk, is imported into England, where, after being refined, it can be sold for 5½d. per lb.; if refined at Dunkirk, and sold there, the same sugar costs 8d. per lb.

Earthenware.—The duty on the import of earthenware in the Zollverein being nearly as high as the first cost in Great Britain, some merchants have established a

* These hooks should be well oiled, or they will scroop horribly.

pottery on the Hanoverian territory, at a short distance from Bremen; the major part of the workmen, as also of the raw material, being obtained from England.

COCHINEAL.—In consequence of the continuation of the vine disease in the island of Madeira, since the commencement of 1852, the cultivation of the cactus for the propagation of cochineal has increased, and is likely to become a source of considerable profit to the island.

The production of cochineal in Teneriffe has made immense strides during the last ten years.

ORCHILL.—Iniack Island, open on all sides to the spacious Bay of Delagoa and the Indian Ocean, is believed to be the only British possession where the orchilla weed grows in any abundance.

Orchilla weed is found in enormous quantities all over the island of Madagascar.

PEARL FISHERY.—It is believed that if the pearl fishery of the Bazarzetto Islands, in 21 deg. 30 min. south latitude and 35 deg. 33 min. east longitude, were properly worked and protected, they would soon rival those of Ceylon.

INDIA RUBBER AND GUTTA PERCHA.—A tree yielding india-rubber and the gutta-percha tree are both found in large numbers on the banks of the Zambesi river, and the Governor-General of Mozambique has been requested to issue an order forbidding any gutta-percha tree being cut down, and pointing out that they should be tapped longitudinally for the extraction of the juice.

NEAT'S FOOT OIL.—Quantities of neat's-foot oil, obtained from the wild animals of Abyssinia, are sent to America.

WINE AND SILK.—In Ancona the vine disease has continued for six years, and the good wine which formerly cost three-halfpence per bottle is now fourpence-halfpenny per bottle, which is considered excessive. The mulberry plantation is yearly increasing throughout the country to augment the production of silk.

SALT.—Much attention is now being paid to the production of salt in the Crimea. It is obtained from several lakes which annually deposit large quantities on the evaporation of the water by the heat of the sun.

POTATO.—The cultivation of the potato in Poland is stated to have increased sixfold. The harvest, in 1857, amounted to 8,750,000 quarters, of which 1,750,000 quarters, besides 214,723 quarters of grain, were used in the distillation of spirits, yielding upwards of 12,000,000 gallons, or nearly 2¾ gallons for each head of the population.

PULU is an article of considerable export from the Sandwich Islands to Francisco. It is gathered from tree-ferns principally, on the Island of Owhyhee, and is used instead of feathers or horse-hair for mattrasses. A sample was sent to Mr. R. C. Janion, in the *Antilla*, an English brig, on her return to Liverpool, in 1858.

COAL.—The coal mines of Cadibona, in the mountains near Savona, in Sardinia, have been neglected till within the last few years—they are now being worked with some energy. They give employment to about 300 men, exclusive of those engaged in transporting the coal to the port of Savona for shipment. Two-thirds of the produce are consumed in the state, the other third is exported to Alexandria. The coal is of a very inferior quality to English coal, and is used for brick-making, for the glass-works of Savona, and for the small coasting and harbour steamers.

MINERALS IN SPAIN.—Several mines have been discovered at Santander, in Spain, consisting of calamine, copper, and iron, which are exported to England, France, and Belgium, from the ports of Santander, Suances, and Comillas, where a French company has been established for working them.

THE MERINO SHEEP was introduced into Greece by Ibrahim Pasha, but has now disappeared.

MULES.—Naturalists may be interested in knowing that in Aleppo a mule, between a donkey and a cow, is now and then met with. Its appearance is very striking—in shape like its mother, but with solid hoofs, and without horns.

TIMBER.—The forests and mines of Bosnia are well worth the attention of British capitalists. The forests have proved a source of wealth to many Austrian and French speculators; and, considering the advantageous terms on which foreign traders can acquire the right of cutting timber, it is strange that British enterprise is still unrepresented here. The Turkish Government merely requires ten per cent. on the amount of timber exported from the province, and is content to receive the impost in kind. One French firm exports annually a million of Bosnian oak barrel staves. The length of the logs cut is necessarily limited, as they have to be transported on baggage animals.

IRON.—The iron of Bosnia is of excellent quality, the best resembling Swedish. It is held in great request at the manufactories of Gratz, in Styria, and large quantities pass into Dalmatia and Servia, in the form of horseshoes. It is found in the form generally known as hown iron ore, and yields thirty-two per cent of pure metal.

SILK REELING AT BRUSSA.—A single reel, as worked in the filatures at Brussa, tended by one girl, may wind off ninety to ninety-five Turkish drachms (or 10¼oz.) of silk per day on the average throughout the year, giving, after deduction of Sundays and holidays, for 265 working days, a total of 631,000lbs. of silk, the produce of 3,712 reels worked in eighty-two filatures.

LATAKIA TOBACCO.—The best exported from Latakia is that produced in the district of Gebel. When this has been hung up in the rooms of the peasants, and there allowed to absorb the smoke of the dwarf oak, it gives a delicious perfume in smoking. It is then called Abu Richa (Father of Scent). It is worthy of observation that the Abu Richa improves a great deal after having been some days on board ship. In Egypt it is in great demand. The peculiar property which this tobacco derives from being exposed to the smoke was accidently discovered as follows:—One year there being no demand for tobacco, the leaves were hung up for the winter in the peasants' huts, exposed to the continual smoke of their fires, and the succeeding year it was sent to Egypt, where it was considered so good that a large order was sent to Latakia for more of the same quality, which was then called Abu Richa.

INDUSTRIES OF ANTWERP.—The principal industrial establishments at Antwerp, and other ports within the province, consist in yards for ship-building, breweries, distilleries; sugar, salt, and sulphur refineries; bleacheries; woollen, lace, flax, oil, and soap factories.

Colonial Correspondence.

THE COMMERCIAL VALUE OF TASMANIAN TIMBER.

SIR,—In bringing the subject of our Tasmanian timber under the notice of the Society of Arts, I have not directed attention to the value of our timber in the neighbouring colonies of Australia, but have confined myself to the question of its probable value in the English market, and to the grounds upon which the estimate of that value is based.

Public attention in Great Britain appears to have been particularly attracted lately to the subject of timber,—not only in connection with the requirements of the ship-builder, but also to meet the extensive demand which is arising for the supply of railway sleepers, to replace those which, from decay, have become unserviceable.

There are three kinds of Gum Trees (*Eucalyptus*) in Tasmania, the timber of which has been found, from constant and long experience, to possess great value for the purposes of the ship-builder, the mill-wright, the carpenter, the implement maker, and the engineer. The best kind of gum timber is generally admitted to be that of the "Blue Gum." (*Eucalyptus globulus*, Lab.) The timber of the "Stringy-bark" (*Eucalyptus gigantea*, Hook, fil.), and of a variety of the "Peppermint Tree" (*Eucalyptus amygdalina*, Lab.), is also greatly prized, and extensively used, for the same purposes as the timber of the blue gum.

All these kinds of timber, especially the two first-named, are particularly adapted for works requiring enormous span, strength, and stability, on account of the great size of the beams which they afford. As an instance, I may mention a plank of blue gum, (which was forwarded for the Great Exhibition in 1851, but arrived too late), the length of which was 145 feet, its breadth 20 inches, and its depth 6 inches. Another plank, of the same scantling, has since been cut, 160 feet in length. The specific gravity of all three kinds is greater than that of Morung Saul, and, of course, considerably greater than that of English oak and East Indian teak. The weight of a cubic foot of blue gum is about 55lbs.; and a seasoned piece of it, 2 × 2 and 7 feet long, will not break until loaded with 1,300lbs. Many vessels, of various tonnage, have been built of blue gum in Tasmania, some of which trade regularly between this Colony and England,—the greater number being employed in inter-colonial commerce. It is in constant use in the Colony for a great variety of purposes, and is held in the highest repute.

Nearly as much may be said of the timber of the stringy bark and of the peppermint tree. The stringy bark abounds in the northern parts of Tasmania, while the blue gum is confined to the southern side. The peppermint tree is more generally diffused throughout the island.

It seems to me that it would be our best course to send, in the form of railway sleepers, all the timber which we are prepared to deliver in England at a low price, leaving the question of a supply for ship-building until there should be a demand for it.

Timber-merchants here would be able to deliver blue gum railway sleepers, 8 × 4 and 9 feet long, in London, at the price of six shillings to seven shillings a sleeper, to the extent of about 70,000 sleepers annually. If the price were raised to eight shillings and sixpence a sleeper, I should think that the quantity exported might soon be doubled or trebled. About 50,000 railway sleepers of stringy bark could be delivered in London at about seven shillings and sixpence a sleeper. The quantity could be greatly increased if a better price were to be obtained.

Now it has been ascertained, beyond a doubt, that the blue gum and stringy bark timber, but especially the former, will remain sound, as planking for ships and barges, for a period of twenty years, when it has been felled at the proper time of the year, and thoroughly well seasoned. It will also last quite as long in the form of sleepers, laid on the ground. It is likewise very durable when in contact with salt water, as piles for wharves and bridges, as well as in the planking of ships.

It is not to be expected that the timber of Tasmania would continue to command a good price unless great care were taken that none of the inferior quality should be sent into the market. To prevent fraud it would be necessary that an Inspector of Timber should be appointed, who should stamp each end of every sleeper or other piece of timber with a mark, the imitation of which should be regarded as felony. A certificate, signed by an authorised officer of the Government, should also be given to every exporter of timber, setting forth the quantity and kinds of timber shipped by him for the English market, as reported by the Inspector. Notice of this regulation should be given to an agent of the Tasmanian Government in London, from whom authentic information might be obtained by purchasers, in order to prevent imposition, and to preserve the character of the timber of Tasmania from the danger of falling in public estimation.

Owing to the want of proper attention to the conditions under which timber is rendered most fit for use, and to the neglect of proper selection, the blue-gum timber, although of excellent quality, has not obtained that rank at Lloyds' to which we think it entitled. It is confidently assumed that such errors will not occur in future; and that greater precautions, and a better knowledge of the best varieties of our timber, may enable us to establish for it such a reputation as it deserves.

When the cost of sleepers of larch and other soft woods is considered, together with their tendency to rapid decay, and the expense of rendering them more durable, it is scarcely being too sanguine to expect that a demand will arise in England for Tasmanian timber, seeing that it is a hard, dense wood, and will last for a very long period, without the necessity of being submitted to any process for rendering it durable, and that it can be supplied at a moderate price.

Under these circumstances I feel thoroughly justified in commending the timber of Tasmania to the notice of engineers and builders in England, and I do it in accordance with the request of the Council and Fellows of the Royal Society of Tasmania, to whom the subject of the communication from the Society of Arts, asking for information relative to the productions of the Colony, has been referred by the Local Government. At a future time I may be in a position to bring other products of this island under the notice of the Society of Arts; but in the meantime we shall feel greatly indebted to the Society, if, through their support and influence, we are enabled to obtain a footing in the English market for our timber.

I am, &c.,

WILLIAM ARCHER, F.L.S.,
Secretary to the Royal Society of Tasmania.

Home Correspondence.

THE HULLAH FUND.

Sir,—The *Journal* contains an advertisement of the "Hullah Fund," to which I am anxious to call the attention of the Institutions in Union with the Society of Arts, for Mr. Hullah is a great public benefactor, who has done more than almost any other individual to promote the instruction and recreation of the masses of the people.

I was in the Education Department when his system of teaching music was first introduced, under the sanction of their lordships, and I have a lively recollection, not only of the ability and enthusiasm, but also of the fastidious disinterestedness which characterised his conduct. I should be sorry to do the least injustice to others, who, some of them at an earlier period, have laboured to make music popular; but, acknowledging the merits of Mr. Hickson, Mr. Turner, Mr. Mainzer, Miss Glover, Mr. Curwen, and others, I do not hesitate to say that, of vocal music amongst the masses of the people in England, Mr. Hullah has been the chief apostle.

When the Committee of Council on Education was first established, the secretary, Dr. Kay, now Sir James Kay-Shuttleworth, was anxious to bring to the knowledge of elementary teachers in this country some of the scientific "methods" of teaching which had received acceptance in France, Switzerland, and Germany. The elementary teacher in our National and British Schools of those days had little or no method in his teaching. The idea of a progressive lesson, in which each step of the learner is a natural consequence of a previous step, and a natural preparation for a further step, was seldom realised; the improved lesson-books of the Irish Commissioners of Educa-

tion were more distrusted than known; and the school books commonly in use, of which there was a miserably scanty supply, were so indifferent that they have since been almost all superseded by an improved stock. The secretary of the Committee of Council induced their lordships to take measures to procure the publication of certain "methods" which might serve as examples, *e.g.*, "Wilhem's Method" of teaching singing; "Dupuis' Method" of teaching drawing; "Mulhauser's Method" of teaching writing; "Pestalozzi's Method" of teaching arithmetic; and the "Lant" or "Phonic Method" of teaching spelling. At this juncture, and before any steps had been actually taken for the publication of any of these "methods," Sir James Shuttleworth heard that Mr. Hullah had, in manuscript, an English version of Wilhem's method, and was preparing to introduce it as a means of teaching large classes of pupils to sing from notes. That MS., subsequently elaborated and perfected by Mr. Hullah, to an extent which makes it an original work vastly superior to Mr. Wilhem's, is the now world-famous "Manual of Vocal Music," which has been the Lesson-Book of millions of pupils—children and adults; which has carried music into thousands of families; which has brightened the intelligence, sweetened the temper, and destroyed the monotony of thousands of schools; which has created an innocent and improving counter-attraction to thousands of haunts of idleness and vice; which has changed for the better the whole character of the Service in thousands of churches and chapels; and which, in the admirable clearness and gradual synthesis of its lessons, has proved one of the most successful examples and models that we have had (since the publication of "Euclid") for the construction of the improved Lesson-books of late years.

Mr. Hullah's singular success in teaching "the masses" to sing, and the happy results which were evident in the conduct of those taught, had a great effect in breaking down the narrow barriers within which it used to be the fashion to restrict the education of the poor, and in reconciling old-fashioned persons to the modern system of Mechanics' Institutes and Athenæums for the instruction and amusement of adults; and in this point of view I am convinced that we should do him scant justice if we attributed to him an influence for good exclusively in connection with music.

Some persons have supposed that Mr. Hullah received large sums from the Government. This is quite a mistake. The Committee of Council on Education gave to him their "sanction," *i.e.*, their patronage; and received from him, in return, an immense increase of their popularity and of facilities for carrying out their views; and when his classes at Exeter-hall were producing a profit which, if he had been unhonoured by the "sanction" of the Privy Council, would have gone into his own pockets, he had to forego that profit in order that it might make good the deficiency occasioned by the other classes of "method" for drawing, writing, and arithmetic, which were held "under the sanction of the Committee of Council" in connexion with his classes.

Having seen abundant instances of his disinterestedness, of his postponement of his own interests to those of his great object—viz., to naturalise in the United Kingdom the power of singing at sight, I feel no surprise at learning that his success in the service of the public has not been attended by sufficient pecuniary receipts; and now that the fire at St. Martin's-hall has produced a crisis, there is naturally a general desire to offer to him some encouragement and help in a substantial form.

That the bishops and clergy, and other ministers of religion, will hasten to prove their gratitude to him who has done such great service to the churches and chapels of all communions among us, no one can have any doubt. That a like zeal will be found among laymen of all classes, I am sure: but I beg permission to point out to the Secretaries of Institutions that in many cases they might afford a valuable co-operation to the Committee of the Hullah Fund by organizing in the towns and villages the means of collecting subscriptions, however small, and of transmitting them to the Committee in London.

I am, &c.,

HARRY CHESTER.

COPYING PICTURES IN PUBLIC GALLERIES.

Sir,—I fear that in my anxiety to avoid trespassing on your valuable space, I must have been too concise to be sufficiently explicit. But as your correspondent who signs himself "S. R.," has renewed the subject, I, in default of some one better able to plead their cause, have again taken up my pen in behalf of a large and respectable body of artists.

I will first of all correct a few important inaccuracies in "S. R.'s" statements, as they are all made to swell up the charges against the unfortunate copyist.

Firstly, the works of modern painters, at the Kensington Museum, are open to the public six days in the week, and not restricted, as he says, to four—the students' days are those on which the admission is 6d. Even were the public not admitted on those days, there would be no economy in neglecting to keep up a proper degree of warmth, therefore nothing extra is expended on account of the students; it may, perhaps, be superfluous to add that the light of day is also quite innocent of any call on the public purse.

Secondly. "S. R." describes the objects an art student has in the gallery, but very much understates the time necessary to study there. I think the period may be safely taken at from two to three years, even in cases where students subsequently become artists of acknowledged talent. Furthermore, it may be well to bear in mind that during the term of study rising genius must eat, and many a student, by selling his copy, procures funds which enable him to prosecute his studies. I must protest against this being termed an abuse of a privilege.

Thirdly. It is not the case that "copyists never become artists," for I know of many instances of young men who, commencing their career by copying, have now become artists of repute. I am now speaking of a time preceding the opening of the Vernon Gallery. When that gallery was thrown open to copyists, I saw many artists there, whose names are now favourably known in the profession. I will here just parenthetically suggest that, bad as many of the copies undoubtedly are, they (if sold) must necessarily be as good as the taste of the purchasers.

Fifthly. I can feel for the sensitive artists, but there is no more help for them than for sensitive composers, and we must make up our minds to excuse imperfections in painting, as in music and other arts. All our great artists must have painted but indifferently at first. But "S. R." falls into a great error when he says that "the artist has always felt much delicacy himself in making a replica of a picture which has passed from his possession." This is so utterly opposed to what is a well-known fact, that I am quite at a loss to understand how such a statement could be ventured on. What an artist's feelings may be it is difficult to define, but the nnmber of replicas painted every year speaks volumes for the successful manner in which they overcome the weakness, if any exists. So general are these repeats, that I think I am warranted in concluding that the supply is governed by the demand. One more mistake, and I have done with "S. R." The permission to copy works of modern painters has been granted ever since we had a national collection, and the same privilege exists on the continent, as far as my knowledge goes, and I have heard of no instance to the contrary. The prohibition as regards the Vernon collection was but a short-lived innovation, never, I hope, to be resuscitated, for admitting, for the sake of argument, that a small amount of evil does result from the practice, there is, as all admit, so much good that such a restriction could scarcely remain in force.

I now come to the question on which I see we differ, and I feel, as it is in a great measure a mere matter of

opinion, on which surmises and vague charges are made to do duty for facts, that I shall have scarcely anything tangible to refute.—I think the question as stated in your *Journal* three weeks ago, and repeated in your last number, is, that certain individuals gain a living by copying modern pictures in the public galleries, and that the practice is injurious to Art. The example given is, that more than one person gains a living by copying "The Age of Innocence," and that the copies are sold to the public, by dishonest dealers, as replicas of the original artist; but of the latter no instance is given. Now, as the punishment for such a fraud is the same as that for obtaining money under false pretences, it must be pretty evident that pictures in public galleries are little likely to be selected, owing to the greater risk of detection their publicity involves. If, however, any facts bearing on this point are known, let a case be made public, or investigated, so that, if practicable, the delinquent may meet the punishment so richly deserved.

The professed copyist is often an artist who becomes such from lack of patronage, opportunity of exhibiting, mistaking his vocation, (a discovery generally made too late,) or want of means; for no one would voluntarily select such a profession, but seek to escape from it as soon as possible. They are required by the public, or they would soon cease to be; nor can I believe that their more fortunate and more gifted brethren begrudge them the moderate amount they wring, by the merest drudgery, from art. Whether the sale of copies is an advantage or otherwise, is so much a matter of opinion that I can only give as mine that nothing conduces so much to the advancement of art, and the education of the public taste, as the distribution of copies of good pictures among those classes to whom the originals are inaccessible, and that the original artist eventually receives the most benefit from the increase of art purchasers.

Before concluding, I avail myself of the opportunity to suggest that if the Society of Arts is desirous of using its great influence in promoting the advancement of the Arts, there is ample scope for exertion in endeavouring to procure adequate space for the annual exhibition of works of art, and the establishment of national drawing academies for the instruction of art students on a scale commensurate with the requirements of the present day.

I am, &c., F. W. R.

January 2, 1861.

INCRUSTATION IN STEAM-BOILERS.

Sir,—All the world knows that the incrustation in steam-boilers is deposited from the water, and that, in tubular boilers, it is very difficult to get rid of; but few are aware that "blowing out" a boiler, to get rid of the sediment on the bottom, hardens the sediment that adheres to the tubes, converting it into a calcareous shell, requiring a smart blow of a hammer to dislodge it.

Will you oblige me by giving to the world, through the columns of your *Journal*, a very simple and efficacious remedy?

I tried the experiment on a 30-horse tubular boiler. In addition to the blow-off cock at the bottom another was fitted over the fire pan, at the usual level of the water, and to the end of it, inside the boiler, was screwed on a funnel of sheet-iron, partly flattened, so that, on the cock being opened, anything floating within eight or ten inches on each side was drawn through.

The engine-driver had directions to open the lower cock once a day, and the upper one when he saw the water in the glass gauge was thick, and keep them open until the water ran clear, but never to blow out the boiler, as formerly. Three or four gallons from the lower, and half that quantity from the upper cock was sufficient to carry off all thick and dirty water.

At the end of *three months*, first allowing the water to get nearly cold, the boiler was emptied; a stream of water was then introduced by the man-hole, and the tubes thoroughly washed. On examination the under half of the tubes was as clean as the day they were made, the upper half discoloured but no scale, and the sides of the boiler in a similar state; on the bottom was about half a bushel of thin scale, broken up into small pieces, that apparently had fallen or been washed from the tubes; thus, after three months' work, there was nothing to do but to get up steam again.

The secret consists in never blowing out the boiler when hot, the usual custom, as the result is—the heat of the tubes and sides instantaneously convert the soft deposit into a hard calcareous substance, and every time the boiler is blown out an additional stratum is added. If the man-hole is taken off on the Saturday afternoon, and the flues opened, the water is cold enough to run off by Monday morning, so that no time is lost, and I have no doubt the hot water might be allowed to run off on the Saturday provided an equally large stream of cold water was allow to run in at the same time, until the boiler and tubes were cold.

I will merely add, the water was pumped from the Thames, and allowed to settle, before being used for the boiler. There is no reason why the plan should not answer equally well for locomotives.

I am, &c.,
HENRY RANSFORD.

Brompton, Dec. 19, 1860.

ITALIAN HEMP.

Sir,—In the discussion that followed the very interesting paper of Professor Leone Levi, "On Italian Commerce and Manufactures," I made a few observations on that valuable product, the hemp of Italy, but in the report of my remarks in your *Journal*, one or two errors occurred. It was about 35 years ago it was first generally used in this country, and not 25, as stated. And in the observations of the Barking fishery for trawling and deep-sea fishing, it is stated our firm introduced the Italian hemp for cordage; it should have been "Italian hemp tanned twine for their trawl-nets." A smack-owner tried one part of a net with Russian hemp twine, the other portion with Italian twine. He assured me that the Russian hemp portion had to be renewed with the same material several times before the Italian hemp portion was worn out.

Few persons are aware of the great importance of our deep-sea fisheries. The town of Barking, in Essex, alone sends out about 300 sail of vessels, besides a great number from Greenwich to Gravesend, vessels ranging from 40 to 80 tons each, costing, upon an average, £1,300 when ready for sea, and the working expenses of each vessel about £900 per annum, taking a vast number of parish apprentices, and training up a hardy race of seamen.

My observations on the use of Irish flax for rope may require some explanation. There are three modes of preparing flax from the straw; one, the old method of steeping, and drying on the grass; also, dew-retting, merely laying it on the grass for a certain time, and occasionally turning it until ripe; the other, a more recent method, adapted for coarse purposes; the flax straw is crushed, when dry, in a green state, without steeping, and then scutched; this leaves all the vegetable matter in that is got rid of in steeping. It is a far less troublesome plan than the old method, and at the present time a very ready market is obtained for it at £35 per ton if well cleaned.

Four tons of flax straw produce one ton of clean, marketable long fibre, and about one ton of scutching tow, worth about £10 per ton, by McBride's efficient scutching machine. The prejudice of landlords is fast giving way to a more enlightened policy, as to the exhausting nature of the crop. It is found that, by feeding stock with the seed, more is returned to the land than is taken out of it. Mr. Druce, the eminent agriculturist, near Oxford, has grown it for years, and for a long time for the seed alone, allowing the flax straw to be trodden under foot in the rick yard for manure, but has now for

some time turned the straw to a profitable account. He expresses his astonishment at many agriculturists spending hundreds of pounds yearly on foreign oil cake, when they can produce a better article, without any adulteration, on their own farms as a stolen crop.

The great difficulty, in the first instance, was to find out the almost *homœopathic dose* of seed to give the cattle, one peck of seed crushed being sufficient for twenty gallons of water, boiled to a mucilage; this, I believe, is sufficient for twenty bushels of chaff put into a large tub, and the mucilage poured over it and allowed to soak for some time; the cattle eat it with the greatest avidity, even if the chaff is composed of musty hay, &c., food they would not touch without the aid of linseed. One acre of good medium land, with $2\frac{1}{2}$ bushels of seed, will produce on an average two tons of flax straw, worth from £4 to £5 per ton, and 16 to 20 bushels of seed, worth about 8s. per bushel.

The flax should be pulled as soon as the root-ends turn brown, which would be about the end of July; and if the land were required for turnips, the straw should be removed to a meadow for ripening the seed; if it is allowed to ripen before pulling, the fibre is much deteriorated. The land is then once ploughed and 3 cwt. of guano harrowed in. Drill in green or white turnips, and there will be as fine a crop, if not better, than if put in by July without the previous crop of flax.

I am, &c.,
EDWIN WARD TRENT.

Homerton.

PLASTIC WOOD.

Sir,—Observing, in the last number of your Society's *Journal*, a short article on the above subject, extracted from a communication to the *Times* by its Paris correspondent, I venture to offer a few observations, which may prevent erroneous views from being taken in connection with this invention.

I endeavoured, about ten years ago, to produce ornamental plastic wood, by the application of pressure and softening the woods, and succeeded to a certain extent, by cold pressure, but without softening the wood; but, as I had anticipated, the "relief" was of very slight depth. Several kinds of wood are capable of being softened by boiling or steaming, (the process adopted for knife-cutting veneers and bending sticks, shafts, and other carriage and ship-building work), but very few indeed can be sufficiently softened to replace the carving for furniture-making. Those foreign woods which are figured by fibres, or various excrescences, or which have fibres traversing the annual rings, are by no means adapted for that purpose. Equally unsuitable are dark-coloured woods, in which, even when the impression is successful, the outline of the "relief" is much less distinct than in light-coloured ones. Of the latter, lime-tree, poplar, and willow, might be used effectually so far as regards the sunk parts of the ornaments, which could easily be pressed into the softened wood, but it is very improbable that the raised parts, retaining the original soft nature of the wood, would ever become sufficiently hardened to resist the effects of time. To apply a chemical remedy would not only be costly, but also detrimental to the texture and colour of many woods, especially oak; the mere application of water or steam to oak will change the colour from an agreeable pale-yellow to an unpleasant reddish hue.

Walnut is, indeed, susceptible of being easily softened; but although it is much liked in England for some descriptions of furniture, when it is richly figured, the plainer sorts would, on account of their dull colour, probably meet with little favour for the imitation of carving.

Several East Indian, Chinese, and Brazilian woods might be named which, being soft as sponge, and yet fine-grained, are especially suitable for pressure, but they are all open, and even to a greater degree, to the objection which I have suggested against the use of the English light-coloured woods. Such delicate carvings as are executed with the chisel by Mr. Rogers and other sculptors, can certainly not be produced by pressure; while if, as we may presume from the list of articles named by the inventor, only a shallow description of carving is aimed at, this can be executed with great nicety by the turning lathe on the "guilloche" system, frequently used for portraits in ivory and wood, and now very much applied to straw-coloured coach-panels, imitating basket-work. But if the imitation of carving of a more raised character be wished for, I believe there is nothing so well adapted as leather ornaments, which have now been brought to an excellent state, and are not very expensive.

As everything connected with wood is in the highest degree interesting to me, I am anxious to obtain as much information as possible on any new invention relating to it; and hope these lines may give occasion to a closer investigation of the subject, which would be much facilitated if the inventor would forward a few specimens to your next Exhibition. The few* which accompany this letter are the results of experiments made ten years ago, and were only intended for book-sides, but found no favour for that purpose.

I am, &c.,
FRANCIS STEINITZ.

London Parquetry Company, Camberwell.

MODERN HOSE.

Sir,—Can any of your contributors solve the great stocking question?

Time was that grey woollen hose and black woollen hose, and sky-blue woollen hose, were knitted by hand, and were at least as durable as the breeches that surmounted them. There were also lambs'-wool white hose, undeniable in their utility; and it is quite clear that in Switzerland—the paradise of woollen hose—durability must be a *sine qua non*. Neither chamois-hunter nor shepherd could afford to darn his hose every night after the day's work.

Yet to this condition must they come, if the stocking disorder, now so rife in England, has penetrated there. We have woollen hose—scarlet, and blue, and black, and brown—exquisite in their colouring, but they are not hose at all in the sense of a durable covering to the legs. It would need a pair new every day to keep up the wear-and-tear. We have got to the condition of Mr. Carlyle in the matter of shoes, and must go shrieking through the land for any craftsman to rescue us from our trouble, by producing, in hose, a veritable antique durability.

"Ah! where is there a bonny boy
Will win both hosen and shoon?"

Is the rot in the wool as well as mutton, or is it all shoddy, that has served as materials in fifty different garments, and has at last been cast out from Houndsditch, treated with cleansing acids till it has neither coherence nor staple left; or is it the felt cloth disagglutinated once more, and shred into a bad likeness of wool, or is it in the dye? Has the process of extracting a brilliant scarlet dye from coal instead of cochineal caused it to be like a coal of fire to burn up the wool. Formerly scarlet cloth was stronger than black cloth, and now the condition is reversed. Come forth, then, wool men of Manchester or Leeds and solve the problem for us how the shops of London may, once more, be supplied with hose, *into* which, but not *through* which, the legs of her Majesty's lieges may be deposited. It is a question for a Manchester politico-economist to "tot up," the amount of waste resulting from such articles as now appear in shop windows, if a ship-load were sent to Australia, and worn out in one day. The breeding, the shearing of the sheep, the spinning, the weaving, the dyeing, the transport, the disappearance, and the vexation, practically throwing a mass of wasted labour

* The specimens may be seen at the House of the Society of Arts.

with a profit on distributing on every stage in the transaction, falling at last on the unfortunately so called economiser, with practically nothing to consume.

Waiting for Manchester or Leeds to reply,

I am, &c.,

W. BRIDGES ADAMS.

Proceedings of Institutions.

Croydon Literary and Scientific Institution.—The last report of the Committee, presented at the annual meeting, held on Wednesday, October 10, 1860, George Curling, Esq., in the chair, states that the Institution has passed through another year of prosperity. At no preceding period has it added so much to its material strength and means for usefulness, and in no like period has there been so large an increase in the number of its members; the one step of its advancement being evidently connected with the other. It is now five or six years since the institution had fallen into a state of feebleness—with but few members, and a worse than exhausted exchequer. But from that time to the present, vitality has gradually increased, and it now possesses resources which have not been equalled in the whole history in the Institution. It is, therefore, with great satisfaction that the Committee submit the report to the members in the Croydon Public Hall; in taking possession of which, with the adjoining rooms, the Committee consider that the Institution has passed from youth into manhood, and has entered upon another and more responsible stage of its existence.

BALANCE SHEET FOR THE YEAR.

	£	s.	d.		£	s.	d.
Income of 1st Quar.	91	11	7	Expenditure 1st Qr.	86	12	2½
„ 2nd „	176	13	1	„ 2nd „	122	7	11
„ 3rd „	78	0	2	„ 3rd „	85	11	8½
„ 4th „	59	10	4	„ 4th „	84	8	0½
Balance from last year	44	18	2	Balance in hands of Treasurer	71	13	5½
	£450	13	4		£450	13	4

By the balance-sheet it appears that the sum of £71 13s. 5½d. remains in the hands of the Treasurer, the expenditure having amounted to £378 19s. 10½d. Since the last annual meeting the Croydon Public Hall has been finished, and the Committee have become the tenants, at a rental of £100 for one year; this sum being agreed upon with the Public Hall Company, on condition of that body receiving one-half of all monies received for hire of the Hall to other parties, the Committee paying all expenses in connection therewith; provided also that the Committee pay a sum of two guineas for every lecture that may be delivered to the members of the Institution above twenty-four in the year. The number of members for the year has been:—First quarter, 590; second quarter, 655; third quarter, 588; and fourth quarter, 611—quarterly average for the year, 611. It is with some degree of satisfaction that the Committee point to the large number of members in the fourth quarter of the year, a result caused by the successful manner in which the conversazione of August 30th was carried out. It was an entertainment which gave great satisfaction to the members assembled, and one of its main features was—that those who catered for the amusement and instruction of those assembled were amateurs, to whom a special vote of thanks is due. During the past year 441 volumes have been added to the library —128 by purchase, at an expense of £8 10s. 7d., and 165 by gift, at an expense of £27 3s. to the donors, who subscribed specially to the library—in addition to which 148 volumes have been presented. Some books have also been purchased to replace those dilapidated, and a great many volumes have been re-bound. The following lectures were given at the expence of the funds of the Institution:—1859: Oct. 18, Mr. Edney, Musical Entertainment; Oct. 31, Mrs. Balfour, "The Buonaparte Family;" Nov. 29, Miss Julia Bleadon, "Operatic Sketches;" Dec. 22, J. K. Applebee, "Writings of Douglas Jerrold." 1860: Jan. 19, Miss Lizzie Stuart, "Scottish Minstrelsy;" Feb. 9, Walter Rowton, "Thomas Ingoldsby;" March 1, Henry Phillips, Musical Entertainment; March 7, W. Parsons, Esq., "Romance of the Law Courts;" March 20, C. R. Weld, Esq., "Arctic Discoveries;" March 29, Dr. Daniel, "Cardinal Wolsey;" April 9, London Quintett Union, Concert; April 20, Dr. Daniel, "Cardinal Richelieu;" May 17, The Brousil Family Concert; June 15, George Grossmith, "Sketches by Boz;" Aug. 30, Conversazione. Lectures were also given gratuitously by the following gentlemen, to whom special thanks are due. 1859: November 17. Reverend W. Mitchell, M.A., "Geometry of Nature;" December 27, Colonel Rowlandson, "A Year at the Cape;" Feb. 2, Reverend W. Shaw," "Kaffraria and the Kaffirs;" Feb. 24, Dr. Halley, D.D., "Paul at Athens;" March 15, Rev. R. Maguire, M.A., "My Schools and Schoolmasters"; May 3, Mr. W. Robinson, "Astronomy;" May 9, Rev. J. B. Owen, "Old School Affectations;" May 24, Dr. T. Spicer, "Character." The year's list embraces 24 lectures and entertainments; the average attendance has been 368. The singing classes are continued with success under the able direction of Mr. Budd. An organ is about to be erected in the Hall, chiefly for the use of the Choral Society of the Institution. This acquisition will, doubtless, tend to promote the cultivation of vocal music. Other classes will be organised whenever a sufficient number of members can be assembled for any subject that may be considered desirable; and the Committee hope the Discussion Class will be resumed at an early date. Soon after the Committee entered on possession of the Public Hall, a special meeting of the members was convened, and considerable alterations proposed in the rules of the Society. These were unanimously acceded to by the members. Whilst a small additional charge is made to the ordinary members now called second-class, a third-class has also been added, at a considerably lower rate of subscription, for whose use a second room has been added, to which members are invited at the rate of 5s. per annum, or 1s. 6d. per quarter. The ticket includes admission to the lectures and entertainments. The Committee also receive considerable support from a number of members who subscribe a guinea annually, but who never take any advantage of their right. The rules now allow those members to have four of these third-class tickets for each guinea subscriber, for distribution to their dependents. The Committee mentioned, in the last year's report, the "Croydon Public Hall Company," and a hope was expressed that the Trustees would be able to obtain 1,000 shares on behalf of the Institution;—this has been realised. The Committee hope in a short time to hold at least one-half of the capital of the Company; and if the liberality of their fellow townsmen should enable them to take part with the Public Hall Company in the purchase of the site, the prospects of the Institution would be materially strengthened. In accordance with the suggestions contained in the last year's report, the Committee invited the assistance of the ladies of Croydon in organising a Bazaar and Fancy Fair. This aid was cheerfully and zealously accorded, and triumphant success was achieved, about £560 having been realised.

Hastings Mechanics' Institution.—The quarterly meeting of members of this Institution was held on Wednesday evening, 7th November, in the reading-room of the institution.—Mr. Womersley (president) opened the meeting, and called upon the honorary secretary, Mr. J. Huggett, to read the report. The annual fête champêtre took place, and, as usual, was quite a success. Notwithstanding the drawbacks experienced on account of the weather, and the being obliged to postpone the fête until the next day, nearly £40 accrued to the funds of the institution. The committee have added about 100 volumes of books to the library from the proceeds of the fête; others will be added shortly. During the quarter 38 members have joined the Institution, and 16 have left. The present

number is 327. A list of lectures to be delivered after Christmas is in preparation. 312 books have been in circulation during the quarter. The committee, in concluding their report, congratulate the members on the success of the Institution. The treasurer's report shows—Receipts during the quarter (including £38 14s. 6d. balance from fête), £63 10s. The expenditure has been £46 4s. 1d. (which includes nearly £20 expended for new books). A balance of £17 5s. 11d. remains in hand.—On the motion of Mr. T. S. Hide, the report was adopted, previous to which, Mr. John Banks observed that he did not notice any reference to classes in the present report. Had any steps been taken towards providing for their accommodation? It was a matter of too deep importance to be let drop entirely.—Mr. Huggett said that a notice paper for four classes had been placed on the notice board, and although it had been there four or five weeks, no class had obtained six names, without which it could not be formed. During some further conversation, it was stated that an opinion prevailed amongst a portion of the committee that the reason why persons did not offer to join the classes was their knowledge that no proper accommodation was provided for them; and also that an attempt had been made to get a room for classes in the upper part of the building, as well as in a house in the neighbourhood.—Mr. T. Edwards at some length remarked upon the whole question of classes, during which he expressed an opinion that there was not now so large a number of young members belonging to the institution as formerly, which would partly account for the apathy.—Some further discussion having taken place, Mr. Hide proposed a cordial vote of thanks to P. F. Robertson, Esq., of Halton-house, for allowing the use of his beautiful grounds for the purpose of the annual fête.—This was seconded by Mr. John Banks, and carried unanimously. It was suggested that the vote should be engrossed on vellum and framed, before it was forwarded to Mr. Robertson.

LICHFIELD FREE LIBRARY AND MUSEUM.—The second report of the Committee, presented to the town Council November 9, 1860, states that the news room goes on steadily, and the daily average attendance has increased during the year. The museum has since the last report been opened to the public, and the committee have every reason to be gratified at the unanimous satisfaction it has given to the citizens and visitors, who have inspected it in great numbers. The committee continue to receive valuable contributions of historical records and curiosities from many kind friends. With regard to the library, the committee much regret they have not been able to bring it into operation. The cost of additional works at the west end of the building, has entirely absorbed the funds at their disposal, and nearly £50 is required to place the books in the library before the readers. This sum the committee had hoped to have raised by the promised donations of some friends, and until nearly this amount is available, the committee are not in a position to fit up the library with tables, gas fittings, catalogues, &c., which are indispensable. The committee acknowledge with thanks the liberal contributions of many books during the year, thereby increasing the number to upwards of 2,000 volumes. Sir Robert Peel, Bart., M.P., has kindly promised to give a lecture during the winter, in aid of the funds of the Institotion.

LOCKWOOD MECHANICS' INSTITUTION.—The annual gathering of the members and friends of the Institution took place on Monday evening, the 24th December. At an early period of the evening the room was greatly crowded, and hundreds were unable to obtain admission. The chairman, Mr. S. Lodge, consequently announced that the committee had determined to adjourn to the Baptist School Room, where the accommodation would be more ample. The proceedings were very satisfactory. The singing class gave a selection of glees, which were followed by songs and recitations of an interesting and amusing character. During the evening Mr. J. H. Abbey gave a Shakesperian reading from "Macbeth." The programme, which was an unusually long one, had not been gone through when the meeting broke up.

MEETINGS FOR THE ENSUING WEEK.

MON. ...Entomological, 3.
Brit. Architects, 8.
Medical, 8½. Dr. Edw. Smith, F.R.S., on "The Action of Alcohol in the Treatment of Disease."

TUES. ...Syro Egyptian, 7½. "Account of Excavations made in Upper Egypt, by Mons. Mariette, under the direction of the Viceroy."
Civil Engineers, 8. Continued Discussion upon Mr. Preece's Paper, "On Submarine Telegraph Cables."
Medical and Chirurg., 8½.
Zoological, 9.

WED. ...Literary Fund, 3.
Geological, 8. 1. Rev. P. B. Brodie, F.G.S., "On the Stratigraphical Position of certain Corals in the Lias." 2. Rev. W. S. Symonds, F.G.S., and Mr. A. Lambert, "On the Malvern and Ledbury Tunnels and other Sections on the Worcester and Hereford Railway."
Graphic, 8.
Microscopical, 8.
R. S. Literature, 8½.
Archæological Assoc., 8½.

THURS...Roy. Soc. Club, 6.
Philological, 8.
Royal, 1½.
Antiquaries, 8½.

FRI. ......Astronomical, 8.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, December 21st*, 1860.]

Dated 7th December, 1860.

3006. W. Morris and J. Radford, Oldbury—Imp. in composition or compositions to be employed in the manufacture of fire-bricks, fire clay, lumps, blocks, retorts, and for all the purposes for which ordinary fire clay is now used, part or parts of which compositions may also be employed as a substitute for emery.

Dated 8th December, 1860.

3007. J. H. Cary, Norwich—An imp. in hammer rails.
3008. G. Davies, 1, Serle-street, Lincoln's inn—Certain imp. in the construction of steam boilers. (A com.)
3009. J. Robson, jun., North Shields—Imp. in mineral oil lamps.
3010. R. Mushet, Coleford, Gloucestershire—An imp. or imps. in the manufacture of an alloy or alloys of titanium and iron.
3011. T. Roberts, Holborn—Imp. in the construction of ships and floating batteries, and in rendering them capable of resisting the destructive force of shot, shell, and other missiles.
3012. M. Jones, Royal Mint—An imp. in apparatuses for preparing the edges of discs of metal for coin.
3013. A. Wheeler, Banner Cross, Sheffield—Imp. in the manufacture of railway carriages, trucks, engines, and other vehicles, so far as the balancing power, springs, and buffers are concerned.
3014. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in apparatus for applying capsules to bottles. (A com.)
3015. B. Hockin, Limehouse—Imp. in the construction and mode of fitting and working furnaces.
3017. D. Annan, 8, Albert-terrace, Bow—Imp. in furnaces and fire bars.
3018. J. Durrant, 63, Warren street, Fitzroy-square—Imp. in chimney pots, or apparatus for the tops of chimneys.
3019. W. E. Newton, 66, Chancery-lane—Improved machinery for making bricks. (A com.)

Dated 10th December, 1860.

3020. A. Granger, 308, High Holborn—Imp. in the manufacture of collars, cuffs, shirt fronts, clergymen's bands, stocks, and articles of a like nature.
3021. A. J. Filliette, 42, Rue Amelot, Paris—Imp. in presses for copying, stamping, and embossing.
3022. T. Peake, Derby—An improved method of locking or "skidding" the wheels of vehicles for the purpose of retarding or arresting the progress thereof.
3023. J. A. Barde, Paris—An improved portable apparatus for producing and purifying lighting gas.
3024. W. Clark, 53, Chancery-lane—Imp. in photographic apparatus. (A com.)
3025. J. Young and C. Cairns, Glasgow—Imp. in making moulds for casting.
3026. R. A. Brooman, 166, Fleet-street—Imp. in implements for digging and breaking up the soil. (A com.)
3027. R. Davison, London-street—Imp. in apparatuses for drying and heating.
3029. R. Hudson, Adwalton, near Leeds—Imp. in means or apparatus for the generation of steam.

3032. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in electric apparatus for striking the hours on bells. (A com.)

Dated 11th December, 1860.

3033. J. Townsend, Glasgow—Imp. in obtaining animal charcoal and other products from bones and other animal matters.
3035. C. Stevens, 1B, Welbeck-street, Cavendish-square—An impermeable anti-sulphuric coating for leather. (A com.)
3041. H. Tucker, 11, Queen-square, Bloomsbury—Imp. in bedsteads.
3043. J. Pym, 4, Lawrence Pountney-hill—Imp. in railway sleepers.

Dated 12th December, 1860.

3045. R. Mushet, Coleford, Gloucestershire—Imp. in the manufacture of cast steel.
3047. A. F. Jaloureau, Paris—Imp. in means or processes for holding, protecting, and insulating subterraneous telegraph wires.
3049. J. Scott, Sunderland—Imp. in reefing and furling sails.
3053. G. Richardson, Mecklenburg-square, and E. D. Chattaway, Bromley—Imp. in apparatus for enabling guards and engine drivers of railway trains to communicate with one another.
3055. S. C. Lister and J. Warburton, Manningham, Yorkshire—Imp. in spinning and doubling.

[*From Gazette, December 28th*, 1860.]

Dated 15th October, 1860.

2508. G. F. Goble and F. S. Hemming, London—Improved machinery for crushing quartz and other substances, and for mechanically and chemically extracting gold from auriferous stones or soils, and for procuring silver, copper, zinc, lead, iron, and other metals from their respective ores or impregnated liquids.

Dated 16th November, 1860.

2820. T. Welton, 29, New Compton-street, Soho, and E. H. C. Monckton, Parthenon Club, 16, Regent-street—Imp. in the application of electricity or magnetism to the human body for the relief of pain and cure of disease.

Dated 20th November, 1860.

2844. P. Palling, Esher-street, Lambeth—Certain imp. in fountain pens.

Dated 28th November, 1860.

2916. J. Robb, Aberdeen—Imp. in gas stoves.

Dated 30th November, 1860.

2938. J. Fry, Wrotham, near Sevenoakes, Kent—Imp. in the arrangement and construction of mills for crushing and grinding grain, seeds, oil-cake, and like matters, the crushing principle being also applicable to cements, minerals, and ores.

Dated 4th December, 1860.

2972. B. Greenwood, 5, Southfield-square, Manningham, Bradford—Imp. in the manufacture of brooms and other brushes.

Dated 10th December, 1860.

3028. R. H. Hughes, Hatton-garden—Imp. in means or apparatus for supplying fresh air to mines and other places.
3030. R. Mushet, Coleford, Gloucestershire—An imp. or imps. in the manufacture of an alloy or alloys of titanium and iron.

Dated 11th December, 1860.

3034. A. J. Canu, Paris—An improved pulverising and bruising machine.
3038. J. Townsend and J. Walker, Glasgow—Imp. in treating bye products arising in the manufacture of soda and potash, for the obtainment of antichlores and other useful products.
3040. G. C. Wallich, 17, Campden Hill-road, Kensington—Certain imps. in apparatus for taking deep-sea soundings.
3042. T. Massey, 4, Birchin-lane—Imp. in sounding machines.
3044. J. Steart, 5, St. James's-road, Blue Anchor-road, Bermondsey—Imp. in treating skins for the manufacture of leather.

Dated 12th December, 1860.

3046. H. Hall, Stack Steads, Lancashire—Imp. in machinery or apparatus for spinning and doubling fibrous materials.
3048. H. Newey, Birmingham—Imp. in the manufacture of certain parts of umbrellas and parasols.
3050. C. P. Moody, Corton Denham, Somersetshire—Imp. in the construction of gates.
3052. S. T. Cornish, Beaumont-square, Mile-end, Middlesex—Imp. in the construction of ships for rendering them shot and shell proof.
3056. R. Pitt, Bath, and S. F. Cox, Bristol—Imp. in apparatus employed in the manufacture of leather.

Dated 13th December, 1860.

3057. J. Casson, Wellington-street, Woolwich—An improved machine for dressing dried fruits, and separating and removing therefrom the stems and other refuse without injury to the fruit.
3058. J. G. Reynolds, 33, Wharf-road, City-road—Imp. in coating or covering the surfaces of smoking pipes and other articles, fictile, metallic, or otherwise, to obtain ornamental and useful effects.
3059. R. Henson, 113a, Strand—Imp. in eye glass and spectacle frames.
3061. C. Neville, Great Dover-road, Surrey—An improved washing apparatus.
3062. T. West, Warwick—An improved apparatus for slicing, shredding, and pulping turnips and other roots.
3063. S. Pitts, 14, Catherine-street, Strand—Imp. in billiard tables.
3064. W. Clark, 53, Chancery-lane—Imp. in the manufacture of gas. (A com.)
3065. Gen. O. Vandenburgh, London—Imp. in the breech pieces of breech-loading cannon.
3066. F. J. Evans, Horseferry-road, Westminster, and G. F. Evans, Brentford, Middlesex—Imp. in the manufacture of illuminating gas.
3067. J. R. Cooper, Birmingham—An imp. or imps. in breech-loading firearms.
3068. E. Jones, Manchester—An imp. or imps. in rifling small arms and ordnance.
3069. C. Reeves, Birmingham—Imp. in breech-loading fire-arms.
3070. R. Mushet, Coleford, Gloucestershire—Imp. in the manufacture of iron and steel.
3071. J. Chubb, St. Paul's-churchyard, and E. Hunter, Wolverhampton—Imp. in locks.
3072. W. D. Allen, Laithfield-house, Norfolk-road, Sheffield—Imp. in the manufacture of the bearings of "brasses" in which the axles of locomotive engines and carriages revolve, and also in the bearings, "brasses," and other parts of plummer blocks employed in machinery generally.
3073. J. A. Mello, Welbeck-street, Cavendish-square—Imp. in the manufacture of stereoscopic slides.

Dated 14th December, 1860.

3074. J. Fenton, Queen-street, Lincoln's-inn—An improved method of securing the wearing tyres on wheels.
3075. J. Jackson, 21, West-grove, St. John's-hill, Battersea—Imp. in lamps.
3077. W. Clark, 53, Chancery-lane—Imp. in signalling from one part of a railway train to another. (A com.)
3078. W. E. Newton, 66, Chancery-lane—Improved pavement for streets. (A com.)
3079. W. E. Newton, 66, Chancery-lane—Improved machinery for cutting and rounding corks and bungs. (A com.)
3081. H. Batchelor, Newport, Monmouthshire—Imp. in the construction and manufacture of models of ships, boats, or other vessels.

Dated 15th December, 1860.

3084. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in building bridges, ships, or other structures of iron or other metal. (A com.)
3086. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in the construction of iron or other metal beams, and in the machinery or apparatus employed for such purpose. (A com.)
3088. A. Kinder, Great George-street, Westminster—Imp. in machinery or apparatus for cutting wood.

INVENTION WITH COMPLETE SPECIFICATION FILED.

3153. W. J. Gibbons, Birmingham—Imp. in stereoscopes and their cases.—24th December, 1860.

PATENTS SEALED.

[*From Gazette, December 28th*, 1860.]

December 28th.

1575. J. Taylor.
1576. J. Soutter.
1583. A. Hawksey.
1592. E. Chetwyn.
1594. J. A. Salmon.
1595. W. E. Gedge.
1597. R. A. Brooman.
1600. C. J. E. Dumont.
1601. J. Haughton.
1603. R. N. Reid.
1608. T. Richardson.
1609. J. Morris.
1610. T. L. Braynard.
1619. J. Haywood, jun., and T. Claridge.
1621. A. Doull.
1636. B. Mitchell.
1637. E. T. Hughes.
1640. J. Leslie.
1643. J. Newman.
1644. R. Pollit.
1649. G. F. Forbes.
1655. R. Wilson.
1656. T. P. Jordeson.
1657. M. A. F. Mennons.
1670. G. Davies.
1678. E. T. Hughes.
1685. F. Mordan.
1697. M. Henry.
1701. S. C. Lister.
1723. H. Gloag.
1732. A. Eskell.
1741. S. P. Jackson and A. Jackson.
1744. J. H. Johnson.
1773. W. E. Newton.
1776. H. Green.
1800. M. A. F. Mennons.
1810. T. Fowler and De Grasse Fowler.
1838. G. H. Birkbeck.
1847. W. E. Newton.
1871. W. E. Newton.
1949. H. Cotterell.
2479. E. J. Hanon.
2527. J. P. Budd.
2643. T. Greenwood and J. Dockray.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, January 1st*, 1861.]

December 27th.

3172. J. Boydell.

December 28th.

3182. V. Mourot.
3188. T. Booth.
3193. R. Harmer.
5. A. Parkes and H. Parkes.

December 29th.

3178. T. Spencer.
3184. J. Blake and R. D. Kay.
3185. F. O. Ward.
3191. A. V. Newton.
3194. C. Buhring.
3200. J. Long.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, January 1st*, 1861.]

December 27th.

2996. E. J. Hughes.

December 28th.

3026. H. C. C. De Ruolz and A De Fontenay.

Journal of the Society of Arts.

FRIDAY, JANUARY 11, 1861.

EXAMINATIONS.—LOCAL BOARDS.

Those Secretaries of Institutions who have not already forwarded Lists of their Local Educational Boards are requested to do so as soon as possible, not omitting to specify the Chairman and Secretary.

Copies of the Programme of Examinations for the present year may be obtained by members of any of these Boards on application to the Secretary of the Society of Arts. In this will be found full instructions for their guidance in making the necessary arrangements for co-operating with the Society of Arts, but should there be any point requiring explanation, the Secretary will be happy to afford it.

GUARANTEE FUND FOR THE EXHIBITION OF 1862.

The following addition has been made to the List of Guarantors and of the sums guaranteed since the announcement in the *Journal* for December 14 :—

Name.	Amount.	Representing the Objects of the Society—Arts, Manufactures, and Commerce.
Amount last announced	£370,500	
Augustus Henry Novelli, 43, Russell-square	1,500	Arts.
Total	£372,000	

By Order, P. LE NEVE FOSTER, *Secretary.*

CONDUCTIBILITY OF MERCURY AND AMALGAMS.

By F. Crace Calvert, F.R.S., and Richard Johnson, F.C.S.

The following paper was laid before the Royal Society last session, being the second part of the paper by the same authors on the relative powers of metals, alloys, and amalgams to conduct heat*:—

Having in our former paper described our experiments upon metals and their alloys, we now give the results obtained with mercury and amalgams. The method followed in the investigations described in this paper is the same as that detailed in our former one. When the amalgams were solid, we melted and cast them in square bars, and filed them down until they were 1 c. m. square and 6 c. m. long; but when the amalgam was fluid, we introduced it into the small iron box (described in the former paper) and determined its conducting power.

Before stating the results obtained with amalgams made of pure metals in equivalent and multiple quantities, we wish to draw attention to the remarkable manner in which heat is conducted by mercury.

But before entering into the details of our experiments, it is necessary that we should state that, having completed our researches some time since, we forwarded the result to the Junior Secretary, Professor G. G. Stokes, for presentation, when he kindly made to us the remark that mercury might be a worse conductor than we had found it to be, and that the means adopted by us were not sufficient to prevent the mass of mercury in the little iron box becoming heated through currents; and he suggested that we should tilt our apparatus, and ascertain what would be the influence of various angles on the conductibility of mercury as determined by our method. By following out this suggestion, we were led to the interesting discovery that mercury is the worst conducting metal known, when the heat is so applied as to prevent the mass becoming heated by currents.

To attain this object, we filled our little iron box with pure mercury, and having ascertained by its weight that it was quite full, we introduced 1 cub. cent. of it into each of the vulcanized caoutchouc vessels; we then poured 50 cub. cent. of cold water, and waited until it had arrived at the temperature of the atmosphere of the laboratory. The larger vessel was in its turn filled with 200 cub. cent. of water at 90°. The apparatus was so arranged that the large vessel, or the source of heat, was placed perpendicularly over the small one. The temperature of the large one was maintained at 90° during one-quarter of an hour by a small jet of steam brought into it when we obtained the following results:—

	Temperature of the 75 cub. cent. at beginning of experiment.	Temperature of 75 cub. cent. at end of 15 minutes.	Conductibility found reduced to 50 cub. cent. water.	Mean.	Silver 1000.
Mercury vertical ...	14·8° 12·6	16·0° 13·7	1·80 1·65	1·7	54

* See *Journal* Vol. VII. pp. 677, 687.

We also tilted the apparatus and gave it gradually different angles, and the conductibility of heat by mercury gradually decreased as the angle increased, showing the following results :—

		Silver 1000.
At a slight angle	13·5 ...	423
Angle slightly increased ...	7·3 ...	229
Angle still more increased ...	6·9 ...	216
Considerable angle	5·1 ...	160

Lastly, the apparatus was used as in our former experiments, the little box being placed in a horizontal position, and the results agreed with those already published; for we obtained

	Mean.		Silver 1000.
21·6, 21·8, 21·5	21·63	or	676

There cannot therefore be a doubt that the supposed good conductibility of heat by mercury arose from not taking into account that mercury being a fluid, its facility to conduct heat was owing to currents. The same may be said of water; for we have observed, as is already known, that it presents a complete barrier to the conduction of heat when the source of heat is applied at the upper part of a column of water. Thus in our experiments we have found that the temperature of the water in the lower vessel did not rise one-tenth of a degree during the quarter of an hour that the water in the upper vessel was maintained at 90° C.

The bad conductibility of heat by fluids when all currents are prevented in their mass, appears to us difficult to explain by the theories of undulation or radiation; for we cannot understand why the imponderable fluid caloric should not travel equally well between the molecules in whatever way the source of heat is applied, or why the undulations should not be as rapid, nay, more rapid in a fluid than in a solid. All these difficulties disappear if we adopt the views of Mr. J. P. Joule, F.R.S., which are that heat is conveyed in bodies by the vibrations of the solid molecules composing them.

The remarkably low conducting power of mercury presents another point of interest, as it establishes a further analogy between heat and electricity. The ratio of conductibility of these two agents by mercury, as compared with that of silver, shows such close relations when examined under the same volumes, that they deserve especial notice. Thus :—

	Heat.	Electricity.
Silver	100·00 ...	100·00
Mercury	5·33 ...	2·12

On the Conductibility of Solid and Semi-solid Amalgams, or those in which exists an Excess of the Amalgamated Metal.

The amalgams belonging to this series were prepared with equivalent quantities of pure metals, and their conductibility for heat confirms the figure (54) which we now publish as representing the conductibility of mercury, silver being 1,000. In fact the observed conductibility of heat by these amalgams agrees perfectly with the theoretical quantities, whilst there exists a great difference between them when we adopt 677 as representing the conductibility of mercury. The calculated numbers are obtained, as in the former paper, by multiplying the conducting powers of the respective metals by the weight, and dividing by the sum of the weights.

Amalgams of Tin.

Formula of amalgams, and per-centages.	Exterior temperature.	Temperature of the 50 cub. cent. of water before experiment.	Temperature of the 50 cub. cent. of water after 15 minutes from 5 to 5 minutes.			Found.	Mean.	Calculated, mercury being 1·7.
	°	°	°	°	°			
$HgSn_2$ Hg 45·88 Sn 54·12	15·0	14·5	18·0	20·8	23·1	8·6	8·65	8·11
	14·8	14·6	18·2	20·9	23·3	8·7		
$HgSn_3$ Hg 36·18 Sn 63·82	15·0	15·1	18 9	21·9	24·5	9·4	9·45	9·2
	15·0	15·5	19·4	22·3	25·0	9·5		
$HgSn_4$ Hg 29·84 Sn 70·16	14·0	13·1	16·9	20·1	22·8	9·7	9·65	9·95
	15·0	14·9	18·8	21·9	24·5	9·6		
$HgSn_5$ Hg 25·38 Sn 74·62	16·0	14·9	19·1	22·5	25·2	10·3	10·6	10·5
	16·0	15·11	19·4	22·8	25·4	10·3		

Amalgams of Zinc.

Formula of amalgams, and per-centages.	Exterior temperature.	Temperature of the 50 cub. cent. of water before experiment.	Temperature of the 50 cub. cent. of water after 15 minutes, from 5 to 5 minutes.			Found.	Mean.	Calculated, mercury being 1·7.
		°	°	°	°			
$HgZn_2$ Hg 60·63 Zn 39·37	...	16·0	19·6	22·8	25·6	9·6	9·70	8·97
		15·3	18·9	22·2	25·1	9·8		
$HgZn_3$ Hg 54·70 Zn 45·30	...	16·1	19·7	23·4	26·6	10·5	10·45	10·05
		17·1	20·9	24·5	27·5	10·4		
$HgZn_4$ Hg 43·50 Zn 56·50	...	14·3	18·4	22·1	25·4	11·1	11·00	12·08
		17·5	21·0	25·2	28·4	10·9		
$HgZn_5$ Hg 38·11 Zn 61·89	...	17·1	22·6	27·2	31·0	13·9	13·95	13·05
		16·2	21·7	26·3	30·2	14·0		

AMALGAMS OF BISMUTH.

Formula of amalgams, and per-centages.	Exterior temperature.	Temperature of the 50 cub. cent. of water before experiment.	Temperature of the 50 cub. cent. of water after 15 minutes, from 5 to 5 minutes.			Found.	Mean.	Calculated. mercury being 1·7.
	°	°	°	°	°			
Hg Bi_2 Hg 31·82 Bi 68·18	15·5 15·5	15·2 15·3	16·9 17·1	18·4 18·5	19·8 20·0	2·1 2·2	2·15	1·87
Hg Bi_3 Hg 23·86 Bi 76·14	15·0 15·0	14·8 14·7	15·7 15·6	16·6 16·6	17·4 17·3	2·6 2·6	2·6	1·89
Hg Bi_4 Hg 19·03 Bi 80·97	14·5 14·8	14·9 15·0	15·8 15·8	16·7 16·6	17·5 17·5	2·6 2·5	2·55	1·90
Hg Bi_5 Hg 15·82 Bi 84·18	13·0 13·5	13·6 13·4	14·35 14·25	15·2 15·1	15·9 15·8	2·3 2·4	2·35	1·91

ON AMALGAMS WHICH CONTAIN AN EXCESS OF MERCURY.

These amalgams, also prepared in equivalent quantities, were all fluid, owing to the circumstance that the proportions per cent. of mercury predominated over those of tin, zinc, and bismuth. The conduction of heat by these amalgams was therefore determined in the small iron box placed perpendicularly, and the source of heat applied at the upper part of the column; and this mode of operating has led us to observe the curious and interesting fact, that all this class of amalgams have the same, or nearly the same, conducting power, viz., from 1·9 to 2·3, although the proportions of tin vary in them from 10·52 to 22·98; those of zinc from 6·09 to 13·97; and those of bismuth from 17·55 to 34·73. All the results obtained with these amalgams being within the limits of 1·9 to 2·3, we think it useless to give the details of the experiments.

CONDUCTIBILITY OF COMPOUND BARS.

In our fomer paper we described some experiments which we had made with bars composed of small cubes of copper soldered alternately with cubes of zinc, tin, and lead, having 1 c. m. of surface, and we showed that such compound bars conducted heat as indicated by theory. Since then we have pursued our researches, and have found that when compound bars are made of cubes of copper and bismuth, or of copper and antimony, then they conduct heat no longer in relation with the calculated numbers, as for instance—

		Found.	Calculated.
No. 1 bar	3 cubes of Copper, 1 cub. cent. 3 cubes of Antimony, 1 cub. cent.	9·45	17·32
No. 2 bar	3 cubes of Copper, 1 cub. cent. 3 cubes of Bismuth, 1 cub. cent.	3·40	13·25*

It will no doubt be remembered that we also experimented upon bars which, instead of being composed of cubes, were made of two longitudinal bars of copper, juxtaposed and soldered to two other longitudinal bars of either tin, zinc, or lead, and that all these bars conducted heat is if they had been entirely composed of pure copper, and had not contained half their bulk of tin, zinc, or lead. We have made, since those results were published, a great number of experiments, with the hope of throwing some light on the above interesting fact, but we regret to say without success. We have, however, noticed a result which deserves to be recorded; it is, that a bar composed of 2 of bismuth and 2 of antimony, juxtaposed and soldered together, is the only one which conducts heat in the same ratio as indicated by theory; for example—

		Found.	Calculated.
No. 3 bar	2 bars of Bismuth 2 bars of Antimony	3·90	3·63

We have also ascertained that the fine film of solder existing between the blades exerts no influence whatever on the proportion of heat conducted by the compound bars, for we have—

No. 4 bar soldered { 2 of Copper, 2 of Zinc } gives 26·35.

No. 5 bar, in which gutta percha was employed to keep together the four small blades ... ... { 2 of Copper, 2 of Zinc } gives 26·35.

* These numbers were calculated in the same manner as in the case of alloys. It has been pointed out to us that in the case of the bars composed of different metals placed end to end, the theory of the conduction of heat leads to the following simple result:—the resistance of the whole bar, multiplied by its whole length, is equal to the sum of the specific resistances of the separate metals multiplied by their respective lengths, the resistance being measured by the reciprocal of the conductibility. This gives for the conductibilities of the bars Nos. 1 and 2, the reciprocal of the mean of the reciprocals of the conductibilities of the two component metals. Taking the numbers given in the former paper, copper (rolled) 26·95, antimony (mean of two) 6·485, bismuth 1·95, we thus find for bar No. 1, 10·45, for No. 2, 3·64, which do not greatly differ from the numbers given by experiment.

THE SPEED OF ARMOURED SHIPS.

BY CHARLES ATHERTON, CHIEF ENGINEER OF H.M. DOCKYARD, WOOLWICH.

The properties of armoured ships as respects the desirableness of high speed having engaged public attention, and popular impressions with reference to the conditions under which progressively increasing rates of speed are to be obtained being extremely indefinite and generally erroneous, I beg to offer a few remarks, in the hope of elucidating this subject, for which purpose the data of construction and equipment of the *Warrior*, as published in the *Times* of the 29th ultimo, and in the *Mechanics' Magazine* of the 4th instant, afford an eligible opportunity. Assuming these data to be authentic, it appears that the load displacement of the *Warrior* will be 9,000 tons; that the engines, of 1,250 nominal horse-power, will weigh 950 tons; that the stowage for coal, 950 tons, is enough for rather more than 6 days' consumption, say $6\frac{1}{4}$ days, being at the rate of 152 tons per day, or 126·66 cwts. per hour, and that the speed of the ship is expected to be at the rate of fourteen knots per hour.

These data assign to the *Warrior* prospectively a very high scale of dynamic duty with reference to the consumption of fuel, for when judged of by the formula $\frac{V^3 D^{\frac{2}{3}}}{w} = C$ (w being the consumption of coal per hour expressed in cwts.), the co-efficient C becomes C=9333,

which is, I believe, higher than has hitherto been realised by the continued sea-service of any ship, and is identical with that on which Coal Table No. 3, "Steam Ship Capability," p. 96, has been calculated, demanding a combination of excellence in hull and engine construction of which it is to be hoped the *Warrior* will be an example.

It also appears that the weight of armament of the *Warrior*, which, combined with the endurance of the ship at full speed, may be regarded as the measure of the effectiveness of the ship for aggression, will be 1,500 tons; consequently, the weight of the hull of this armoured ship of 9,000 tons load displacement, after deducting weight of engines, coals, and armament, will be 5,600 tons, or 62 per cent. of load displacement of the ship, being from 15 to 20 per cent. heavier than ships of the same load displacement of ordinary build, and this it is which, in combining high speed with long endurance under steam, causes the necessity of unusual magnitude in the construction of armoured ships.

Seeing, now, that various steam-ships attain the speed of 18 knots per hour—for example, the Holyhead and Dublin mail packets—and that high speed has been much insisted upon as essential to the efficiency of armoured ships, my object now is to demonstrate the conditions of construction as respects size and power which would be required in order that an armoured ship of the *Warrior* type might attain the speed of 18 knots per hour, and carry an armament of 1,500 tons weight, and coal enough to steam at the reduced speed of 14 knots per hour continuously for 6¼-days, thus possessing the same progressive power, and the same steaming endurance at 14 knots per hour as the *Warrior*, but in addition commanding the speed of 18 knots per hour, when so required, so long as her coals will last.

To increase the speed from 14 to 18 knots per hour may appear, at first sight, to be a simple matter—merely demanding that the engine power should be increased in the same proportion—but the fact is, that the engine power, and consequently the weight of the engine, would be required to be increased in the proportion of the cubes of the speeds, thus demanding an increased size of ship, as measured by load displacement, to carry the increased weight, and this increased ship again demanding still further increased power to attain the required speed; thus the problem becomes complicated, but the following calculation, chiefly deduced from the tables before referred to ("Steam Ship Capability," page 96, second edition), shows that, in order to realise the before-mentioned conditions, the load displacement of our armoured ship requires to be increased from 9,000 to as much as 15,000 tons. For example: assuming 15,000 tons to be the required displacement, the weight of the hull at 62 per cent. will be 9,300 tons; the engine-power required to propel this ship of the *Warrior* type, at the speed of 18 knots per hour, will, by received rules in steam-ship dynamics, be three times that required to propel the *Warrior* of 9,000 tons at 14 knots per hour; and the weight being increased in the same proportion, we have 2,850 tons as the weight of the engines; also, by the formula $\frac{V^3 D^{\frac{2}{3}}}{w} = 9333$, the assumed co-efficient of the *Warrior*, the weight of the coal (w) to propel this ship of 15,000 tons displacement at 14 knots per hour will be 178·33 cwts. per hour, or 214 tons per day, at which rate the quantity required for 6¼ days' consumption will be 1,338 tons. Hence, we have weight of armoured hull 9,300 tons; weight of armament 1,500 tons; weight of engines for steaming at 18 knots per hour 2,850 tons; coal for 6¼ days steaming at 14 knots per hour, 1,338 tons; making the total load displacement 14,988 (say 15,000) tons. The displacement of the Holyhead and Dublin Mail Packets, when steaming at the speed of 18 knots per hour, is understood to be about 2,500 tons; but in this case the weight of hull probably does not exceed 40 per cent. of the load displacement; the cargo consists merely of a few passengers and mail-bags, and the coal is only required to be sufficient for about six hours' consumption, which conditions are altogether different from those required in armoured ships of war.

The comparative steaming endurance of the two ships now under consideration would be as follows:—

"Warrior," as constructed for 14 knots speed, with 9,000 tons displacement. Coal, 950 tons.	"Warrior," enlarged, if constructed for 18 knots speed, with 15,000 tons displacement. Coal, 1,338 tons.
At 10 knots, the consumption would be 55·6 tons per day, lasting 17 days.	At 10 knots, the consumption would be 78·2 tons per day, lasting 17 days.
At 12 knots, the consumption would be 96 tons per day, lasting 10 days.	At 12 knots, the consumption would be 135 tons per day, lasting 10 days.
At 14 knots, the consumption would be 152 tons per day, lasting 6¼ days.	At 14 knots, the consumption would be 214 tons per day, lasting 6¼ days.
Above 14 knots not attainable, the engine-power being limited to that speed.	At 16 knots, the consumption would be 320 tons per day, lasting 4 days.
	At 18 knots, the consumption would be 456 tons per day, lasting 3 days.

Thus we see that the steaming endurance of the two ships would be equal up to 14 knots per hour, but that, in order to attain the superior capability of steaming for three days, at the speed of 18 knots per hour, we require to increase the size of the armoured ship from 9,000 to 15,000 tons load displacement, and to treble the engine power, whereby the cost of the ship would be probably doubled—or two such ships as the *Warrior*, limited to 14 knots speed, would be built for the cost of one ship constructed for 18 knots, though limited to the same amount of armament—1,500 tons—and the same steaming endurance, viz., 6¼ days at the speed of 14 knots per hour. The question therefore becomes, Whether two ships of the capabilities of the *Warrior*, as now constructed for 14 knots speed, would, in their co-operation, be more or less effective than one ship constructed for 18 knots speed, but carrying only the same armament—a question most interesting to naval men—but in regard to which my object has been merely to open up the mechanical considerations of the case. Practically, there is no limit to magnitude and speed; it is a mere question of money; and, whether ships be built of wood or of iron, is, practically, a mere question of appliances and tools.

Woolwich Dockyard. Jan. 8, 1861.

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS.

(*Continued from page 99.*)

India Rubber. — The demand for india-rubber, the principal and staple product of Para (Brazil) has diminished, and is diminishing, in consequence, in a great measure, of the quantity produced on the west coast of Africa and our East India possessions, and in some degree from its having for many purposes been superseded by gutta-percha, and its application to other purposes relinquished. It is now at least 120 per cent. cheaper than it was in 1854.

Coal.—It is now evident that a grand coal-field exists at St. Catharines (Brazil), of sixty leagues, in an east and west direction, that is, from the sea-coast of the Atlantic Ocean to St. Gabriel, and perhaps much further; and along the coast, probably 140 or more leagues, beginning from Laguna, in the province of St. Catharine, and continuing south almost to Monte Video. These mines of the Erral, so called, are not of the best quality, but they have not been explored beyond thirty yards in depth, because coal has been found at Arroio dos Katos, much more convenient to the village of Sao

Jeronymo, situated on the margin of the River Jacuhy, and the nearest place for embarkation being only two leagues, whilst the mines of Erral are ten leagues off. Sao Jeronymo is twelve leagues from Porto Alegre, situated on the left-hand side of the river, just opposite Triumfo, called in most of the maps Villa Nova. At Arroio dos Katos, the first seam of coal was found by boring-rods, at forty-five yards deep, and the seam is five feet in thickness. It is steam coal of very good quality; some hundred yards of galleries have been worked, which have supplied the steamers of the province. Forty yards below this seam another four-feet seam has been discovered, of even better quality than the five-feet seam. There are many leagues of these two seams. Coals have also been found in many other parts.

Hydraulic Limestone.—A bed of hydraulic limestone, twelve feet in thickness, has been discovered near to the village of Sao Jeronymo. It has been proved at the lime works of Rio de Janeiro, by Mr. Charles Neate. He found the sample to be equal to the Welch lime they are now using in making a dock wall in that city.

Algeria.—A regulation was promulgated on the 30th March, 1857, prohibiting the cooking of provisions or the melting of tar on board merchant vessels or on the quays, except in the public kitchens or fire-places established on shore. The charge is fifteen centimes, or 1½d., for each fire-place used for each meal, and fifty centimes, or 5d., for each cauldron of pitch, tallow, or tar melted in the fire-place. Merchant, steam, or sailing vessels are now allowed to have provisions cooked on board by having a guard at the rate of three francs a day.

Minerals, such as copper, iron, lead, zinc, antimony, and mercury are found in Algeria. The most considerable are those of copper, near Tenes, and of mouzaia, near Blidah, in the province of Algiers, from which a considerable quantity is exported annually to Swansea. All other exports are almost exclusively for France.

Trade Guilds.—In Frankfort the privileges enjoyed by the several guilds stand most materially in the way of the otherwise increasing prosperity of the town. A citizen who takes up his freedom for a particular trade or profession must confine himself exclusively to that particular trade, and cannot combine any other trade with it. For this reason, no manufacturer of carriages, or railway carriages for example, can exist there, because the tradesman, supposing him to be a saddler, must employ a blacksmith for the iron and a wheelwright for the wooden material of his carriages.

Spirit from Currants.—At Patras (Greece) a Joint-Stock Company is being formed, under the auspices of the Government, for distilling wine and spirits from the inferior descriptions of currants, and it is proposed to bring clever workpeople and manufacturers of wine and spirits from France and Sicily.

Gold.—Sofala is situated at the mouth of a river of the same name, in latitude 21 deg. 11 min. south, and longitude 34 deg. 45 min. east. The Sofala river leads to the auriferous portion of Eastern Africa. Solfa is by some considered the ancient Ophir of Solomon, in whose days ships were sent from Tarshish to obtain gold from mines which are even now as productive as ever, but entirely neglected. The only gold at present sent from Sofala is a small quantity occasionally picked up on the surface of the earth after heavy rains. On both banks of the river Sofala, and from that river northwards to the southern bank of the Zambesi, the country is one mass of mineral wealth—gold, silver, copper, and toward Tete even iron and coal being found in abundance. Ruins of cities, once the dwelling place of nations mighty in their industry, are to be seen in this region—perhaps telling the history of those who provided gold for the Temple of Solomon.

Products of Angoxa.—The kingdom of Angoxa, latitude 16 degrees 39 minutes south and longitude 39 degrees 46 minutes east, having a seaboard of 90 miles, and reaching into the interior for upwards of 180 miles, has in a few years, by abandoning the Slave Trade, and developing the resources of its natural productions, risen to the position of a free and independent kingdom, whose trade is open on its express invitation to the civilised world. Already it supplies immense quantities of simsim, or sesame, or *gergulin* seed, which appears here particularly to thrive, the oil from which is a valuable article of commerce, being used as a substitute for olive oil, and much prized for the finer portions of machinery. Ivory in abundance; ebony, orchilla weed, gum copal, cocoa-nut oil, coir, and ground nuts, form the principal portions of the cargoes of fleets of Dhows trading in the season between Angoxa and the dominions of the Imaum of Muscat.

Gold, Silver, and Malachite.—The natives from the far interior bring down to Messourie, on the mainland opposite the city of Mozambique, every year gold, silver, ivory, wax, skins, and malachite, the latter in considerable quantities, showing that there are mines of copper in the Monomoises country. When Mozambique was in the hands of the Arabs an important trade was carried on between Arabia and India, but for the last 200 years, under its present rulers, the trade, principally carried on by Banyans to Cutch and Goa, has been gradually decreasing. At present it exports of ivory annually 250,000 lbs., beeswax, sesame seed, orchilla, rhinoceros horns, cocoa nut oil, castor oil, ground nut oil, cork, arrowroot, sago, coffee, tortoiseshell, indigo of an inferior quality, from ignorance in manufacturing it, and a spirit made from the cachu.

Cloves.—The cultivation of cloves was introduced into Zanzibar, lat. 6 deg. 28 min. south, long. 39 deg. 33 min. east, from the Mauritius in 1818. They thrive so well that the cultivation of them has, in a great measure, superseded that of the sugar cane, and even the cocoa nut.

Yellow Bark.—In the Island of Madagascar there is produced a yellowish red bark, inside looking very much like saffron; outside it is grey, and is estimated at £40 sterling per ton. Gutta percha is also to be found in abundance, being the gum from Bois de Natte.

Nut-galls.—At Latakia, in Turkey, nut-galls, and wax, can be had for the gathering; also cochineal, but they are not now collected. Ibrahim Pacha forced the peasants to gather all three.

Leather.—A considerable quantity of skins of the wild boar are sent from Latakia to Mount Lebanon, where they are tanned, and then sent back to Latakia. The leather is used for the soles of shoes. Abundance might be had for export. Saddlers there do not make use of them.

Cotton.—15,000 cantors of cotton are produced yearly at Orfa, in Turkey, but none is exported, as the people do not understand the separation of the seed. The cantor contains 180 okes. The market price is 200 piastres per cantor.

Ancient Vases and Gold Ornaments are often picked up by the inhabitants of the Island of Astropalia or Stampalia, in the Ottoman Archipelago. It is a singular fact that no serpents or reptiles exist on the island, and although they are sometimes found among the firewood which is imported, they do not live.

Anchors.—It would be an immense advantage to the inhabitants of the island of Cassos if chain-cables, anchors, and other ship's gear were taken direct to Cassos. They are at present obliged to get them at Syra.

The Mineral Products of the island of Cyprus have hitherto been unexplored. It is, however, certain that many mines would be discovered of sulphur, coal, copper, iron, and perhaps also gold and silver. Romance speaks much of treasures concealed in the isle of Cyprus. The island possesses two rich natural salt pits, one of which is situated half a league from Larnicu, and the other a third

of a league from Limasol. There are also coloured earths, trees, and roots, adapted for dyeing, and medicinal plants; pot herbs grow wild in the fields and prairies, while on the hills exist rich pastures which would feed numerous flocks. The island produces wool, cotton, alizaris (madder) silk, flax, sesame, tobacco, colocynth, oil, wine, figs, currants, oranges, honey, pitch, skins of sheep and hares, yellow, red, and green umber, butter, and cheese. There is not a single bank in all the island; the want of an establishment of the kind is sensibly felt. The present state of Cyprus is that of a country which once was celebrated, rich and populous, which now is but the shadow of its former days, but for which a better destiny may be reserved.

Flavour of Mutton.—The flesh of the sheep of the island of Halki is highly esteemed, it having a delicious taste, in consequence, it is said, of the animals drinking only salt water. This fact is said to be well attested.

Emery Mines.—A few years ago some emery mines were discovered in the Island of Leros, but they are not turned to any account. There is a castle on the mountain, overlooking the village, in good condition; built by the Knights of St. John, erected, from all appearances, on the ruins of a large ancient Greek edifice. Inside the castle there is an immense tank, in perfect repair, which is used now, as it was, no doubt, formerly, to hold rain water. Within this castle a granary was lately found full of Indian corn, supposed to have been there since the time of the Knights, which was, of course, unfit for use.

Marble.—There are quarries of the finest marble in the largest of the Fourni Islands. About thirty years ago a beautiful marble statue was found among some ruins near Phanari, which the people of that village broke to pieces. Some remains of ancient Greek towns are visible. An Hellenic architect, of Tinos, wished lately to make a contract with the proprietor of the island for a supply of the marble, but they could not come to terms.

Gum Mastic is obtained from a tree of the same name. The tree rarely exceeds 8 feet in height; its leaves are evergreen, and resemble those of the turpentine tree. Mastic is one of the principal resources of the Island of Scio. To extract the gum, incisions are made on the main trunk of the tree, and from them the gum issues. Previous to 1850, the trees produced from 45,000 to 50,000 okes; but in consequence of their being killed by frost in that year, the quantity was greatly reduced, but, in 1858, 20,000 okes were collected. The Mastic tree cannot be cultivated except in the north part of the island, and all attempts to propagate this tree, whether in other parts of the island, or in other countries, have totally failed.

Brandy.—The brandy of the Island of Scio is considered the best in Turkey, chiefly on account of the mastic put with it, which gives it a peculiar flavour. It is sent to Constantinople to the value of nearly one million piastres yearly.

Saw-Mills.—The number of saw-mills in the State of California, U.S., is 388, of which 178 are propelled by steam and 210 by water; and their aggregate capacity is 500 millions of feet (board measure) per year.

The Climate of South Carolina.—The climate of this region is healthy during the winter months, but deadly to whites from May to October, a single night passed on a rice plantation being sufficient to induce an attack of the so-called "country fever," a bilious fever of the most malignant type, more dangerous even than the yellow fever.

Shells.—From Cape St. Sebastian to St. Augustine's Bay, Mozambique, the French carry on a trade in shells called *casques*, used in the arts.

Cowrie Shells.—One Hamburgh house sends annually fourteen vessels to Zanzibar for cargoes of cowries, with which they proceed to the rivers on the west coast of Africa, and purchase cargoes of palm oil.

Trade Law.—At Odessa, according to the general Russian law now enforced, the permission to trade or to carry on any sort of retail business is strictly limited to the members of three guilds paying a certain annual tax, and becoming thus possessed of specific rights. A first-guild merchant may transact business to any amount with foreign countries, or with the interior. He pays 979 roubles 15 copecs, or £150 12s. 9d. annually, and may open three shops for the sale of goods by retail. The first guild now consists of twenty-five merchants, of whom five are Hebrews.

FINE ARTS IN IRELAND.—TAYLOR PRIZES AND SCHOLARSHIP.

By the will of George Archibald Taylor, Esq., late of Dublin, the sum of £2,000 was placed at the disposal of his Executors for the promotion of art in Ireland; and, in pursuance of his enlightened design, a perpetual endowment has been established for the encouragement of Art-Students, in the manner and according to the terms and conditions following:—

1. The general management of the scheme is entrusted in the Royal Dublin Society, in conjunction with the Executors and Trustees of the will for the time being.

2. The fund will be invested in Government stock to the credit of Charles Edward Bagot and Charles Leech (or other the trustees or trustee for the time being of said will), and of the Royal Dublin Society. An account of its administration will be printed every year with the proceedings of the Society; but the fund shall at all times be kept separate and apart from the general funds of the Society.

3. The dividends will be applied, after providing for the necessary expenses of the trust, to the endowment of scholarships and money prizes, which will be open to all students of art, of either sex, who shall have attended for two years at least a school of art in Ireland, or who, being of Irish birth, shall have attended for the like period a school of art elsewhere, and who shall produce at the exhibition hereinafter mentioned works of art displaying conspicuous merit or high promise of future excellence.

4. An annual exhibition will be held in Dublin of the works of art which shall be sent in for competition, and public notification will be given at least six months previously of the scholarships and prizes to be competed for, and of the regulations and conditions to be observed at such exhibition.

5. The subjects for competition will from time to time be defined and determined by the Trustees.

6. The amount of the money prizes will be in the discretion of the Trustees, having regard to the merit of the works exhibited; and when high artistic talent shall be manifested, one or more scholarships (to be called the Taylor Scholarship) of £20 or upwards may be awarded, which may be held for a second and a third year, provided the student shall produce in each year a work of sufficient merit.

7. The prizes and scholarships will be withheld in whole or in part, when there shall not be adequate merit in the works exhibited; and the amount so reserved will be added to the principal of the fund.

8. The prizes and scholarships will be awarded upon the report of judges, of whom one shall be chosen by the Council of the Royal Dublin Society; another by the Royal Hibernian Academy; and a third by the Governors and Guardians of the National Gallery of Ireland. Should the names of the judges not be returned to the Royal Dublin Society at least one week before the opening of the Exhibition, or in the event of any of the judges so

selected failing to act, the Royal Dublin Society, or, should they omit to do so, the Trustees of the Will will nominate one or more judges, so as to make up the number of three. The three judges shall be at liberty, if they think proper, to call in one or two additional judges to assist them. No teacher of Art shall be eligible as judge.

9. All the arrangements for carrying this scheme into operation, and all alterations therein, shall in every case be subject to the approval of the Trustees of the Will for the time being.

10. The work sent in for competition are not to be of less dimensions than the following:

Pictures in Oils—The size of the cloth, in surface equal to 29 inches by 36 inches.

Water Colour Drawings—30 inches by 25 inches.

Sculpture—The figures to a scale not less than two feet; the models to be *baked* or cast in plaster.

Architectural Drawings to be as large as a whole sheet of Double Elephant; may be of exterior or interior; to be carefully finished and washed; and if of an existing building, to be from actual measurement.

The Pictures need not be framed.

11. Each work must be accompanied by a brief description of the subject, and also by a statement of the name, age, and birth-place of the artist; of the place where he has studied, and where he shall at the time be actually a student; also by a certificate of his having studied for two years at least in some recognised School of Art; and proof must be given, if required, of the correctness of these particulars, and of the work sent in being actually the production of the party competing.

12. A prize in any one department cannot be obtained by the same student more than twice.

13. Candidates for the Scholarship must be prepared to satisfy the Trustees of their intention to devote themselves to Art as a profession. A Student having obtained the Scholarship, and desiring to retain it for a second or third year, must compete for it by a new work in the Exhibition of each year.

14. Works sent in for competition may be detained a month, if required by the Trustees. No copy or sketch can be made from them without permission of the artist and the Trustees. They may be sold in the Exhibition, if the artist wish.

15. They must be delivered at, and removed from, the place of exhibition at the expense of the student. The trustees will take all reasonable care of the works, but will not be answerable for injury.

16. The judges will examine the works in a private view, and will make their adjudication in writing, with such remarks and recommendations as they may think proper to offer to the Trustees. The Exhibition will then be opened to the public, on such terms and conditions as the Trustees shall determine.

17. The Trustees do not prescribe the precise subjects of the prize works, discrimination in the choice of a subject being regarded as, in some measure, a mark of artistic capability; neither do they put any limitation on the age of the competitors. But in the adjudication every circumstance will be considered with reference to the prime objects of the endowment, namely, the encouragement of the school of art in Ireland, and the development of Irish talent; and the Trustees reserve to themselves the absolute right of determining whether the party competing be strictly a student, and in other respects come within the intention of the Trust.

Communication on the subject of the Taylor Prizes and Scholarships may be addressed to Ralph B. Brunker, Esq., Solicitor to the Executors, 31, York-street, Dublin; or to William Edward Steele, Esq., M.B., Assistant Secretary to the Royal Dublin Society.

For the year 1861 the following Prizes are offered, to be awarded at an Exhibition to be held on the 30th October, 1861, at the House of the Royal Dublin Society:—

1. For the best Picture in Oil Colours, the subject historical or familiar £10
2. For the best Landscape in Oil Colours........ 10
3. For the best Composition in Sculpture 10
4. For the best Water-colour Drawing (subject or landscape) 10
5. For the best Agricultural Drawing (elevation in perspective, with plans, of some known building, or a Design) 7

The Prizes may be increased or lowered in amount, or may be wholly withheld, according to the merit of the works exhibited.

In addition, a student manifesting high artistic talent may obtain a Taylor Scholarship of £20 or more, which may be held for a second and third year, provided a work of adequate merit be produced in each year.

All works must be delivered before two o'clock on Saturday, 21st October, 1861, at the House of the Royal Dublin Society, Kildare-street, Dublin, where, in the meantime, further particulars may be ascertained.

PLASTIC WOOD.

The following additional information on this subject appears in the *Manchester Examiner*:—

One of the results of the late French treaty has been the introduction into this city of a new product of art and industry, called "bois duré," which will cause quite a revolution in the manufacture of many articles of ornament and general use, and, to judge by the remarkable applications that we have seen, the discovery is a great success. Bois duré, or hardened wood, which has been improperly described as wood softened and then hardened, is made from sawdust, which, under the influence of a high temperature and the enormous pressure of 600 tons, acquires a hardness a good deal exceeding that of wood. It is of a very fine grain, and fears no atmospherical variation; but its principal merit is its adaptation to moulding, and by the most economical processes forms and impressions are given which would require, in any other way, considerable labour and workmanship. We have seen various articles of great beauty manufactured from it, such as writing-desks, inkstands, seal-handles, medallions of royal and public characrers, and even binding for books; on these, carving and the most delicate sculpture are reproduced with the perfection of models, and with exquisite fineness of execution. In Manchester there are one or two places where the products of this new art can be seen

ARTISTIC COPYRIGHT.

A deputation of publishers, consisting of Mr. Graves, Mr. Gambart, Mr. Fores, Mr. Hayward, Mr. Lloyd, and Mr. White, waited upon Sir George Cornewall Lewis, at the Home-office, on Wednesday last, for the purpose of obtaining facilities for stopping, at the Custom-house, piracies of English engravings, and also a more speedy and less expensive remedy against photographers and other producers and sellers of pirated copies of English copyright engravings.

Home Correspondence.

COPYING PICTURES IN PUBLIC GALLERIES.

Sir,—I esteem the space in the Society of Arts *Journal* too valuable to be occupied by individual discussions; and having been permitted to express my opinion upon the practice of copying in our public galleries, founded upon the facts as I view them, I should have left the diametrically opposed opinions of "F. W. R." to the judgment of the readers of the *Journal;* but "F. W. R.," huddling

together opinions and facts, accuses me of important inaccuracies, mistakes, vague charges, and surmises,—hard words, for which I should regret to have given any grounds, and equally regret to retaliate. It is only in the cause of truth that I ask to reply to his allegations, from firstly to fifthly.

1st. The notice posted at the gallery at Kensington distinguishes the days of admission as "Free Days" and "Students' Days." But I am corrected by "F. W. R.," who states that the public may be admitted on the students' days on payment of 6d. Now the public, as I stated, is, in fact, excluded by the payment of this fine, levied that the student may enjoy a comparative seclusion; and the public will find, on paying their sixpences, that many of the most popular pictures are hidden from their view by raised platforms, large canvasses, and easels, and, not unfrequently, by idle, gossiping groups of copyists, who look upon the public as intruders if they come between them and the many pictures they hide from view. That the public are at no loss, on the ground of expense on the students' days, as the galleries must in any case be warmed, is surely a very idle argument. There must be some public capital laid out in the galleries, and not a little charge for their maintenance, attendants, and many *et ceteras*, besides coals.

2nd. I am informed, with a protest, that the one year I had assigned to the art student for copying is not enough, and that the period "may safely be taken at from two to three years." I cannot admit any "important inaccuracy" in this. I know that I shall be fully borne out in saying that it would be difficult to find one of our eminent artists who had spent even twelve months in copying.

3rd. There may be found an exception to the general assertion "that copyists never become artists." It is nevertheless true, though "F. W. R." has known many instances. On my part I can assert unhesitatingly, that, having had the pleasure of associating with the greater number of the most eminent artists of the present day, I cannot call to mind one such instance; and it will be some evidence I think of the value which they place upon copying, to add, that the Council of the Royal Academy, not desirous to encourage even the very limited amount practised in their schools, are reported to have recently withdrawn the medals which have been heretofore awarded annually to the students in the school of painting.

5th (for I suppose "F. W. R." expunged his fourth charge on second thoughts). I must repeat the statement which I made with respect to the practice of making replicas by all the best artists, and I trust that "F. W. R." will forgive me the direct contradiction which I feel bound to give to his assertion of the principle of "supply and demand" in such cases.

It would be useless to repeat my opinion upon the merits of "F. W. R.'s" "professed copyists," who subsist "by the moderate amount they wring by the merest drudgery from art." I am sorry for them; they have either been led aside from their true vocation, or have been made mere copyists by the pernicious facilities afforded to them. "F. W. R.'s" reference to foreign galleries appears equally ill-founded. It is but too well known that in those states of Germany and Italy, where the largest class of "professed copyists" may be found in the public galleries, modern art exists only in the most degraded—most debased form.

I will only add that, the subject having been brought under public notice, the evil will find a remedy, despite much better advocates than "F. W. R."

I am, &c., S. R.

January 7th, 1861.

ITALY AND THE INTERNATIONAL EXHIBITION OF 1862.

Sir,—The able paper read by Professor Levi on the 12th ultimo, on "Italian Commerce and Manufactures," and that by Mr. Tansley on "The Straw Plait Trade," on the 19th ultimo, were so complete and exhaustive that they left little room for either criticism or discussion. They were, however, to some extent suggestive, particularly as regards the impending International Exhibition of 1862. This is especially the case with respect to Italy, as the Exhibition will afford to the artistic and industrial population of that country the opportunity of showing that, having achieved a national position worthy their ancient renown, they also aspire to corresponding eminence in the arts of peace. What that was in 1851 and 1855, particularly as regards Naples, I have already explained during the short discussion which followed the reading of the Professor's eloquent paper—what it may be now that all Italy is free, or nearly so, we shall soon have the opportunity of knowing. Freedom of international commercial intercourse must follow in the wake of national and personal liberty, and property being also secure, the industrial capabilities of the whole peninsula will soon be in a train of development.

I cannot say I am one of those who think the success of periodical international exhibitions is materially dependent on the incidence of war or peace. The statistics of commerce—especially of late years, when tranquillity has been disturbed not only in Russia and Italy, but more recently and expensively in India and China—sufficiently demonstrate that the creation of material wealth by labour and skill is, or may be, coincident with the flow of time, the results of experience, and the increase of population. The world cannot stand still, for the mighty impulse which the profitable application of important agencies, long perhaps known, but imperfectly understood, such as gas, steam, and electricity, has given to the loom, the plough, the ship, and the rail, will not only not be arrested by the exceptional condition of war, but will acquire additional force as the old and the new wants of society create demands which must be supplied. At the same time, I am far from undervaluing the advantages which a state of peace confers on these exhibitions; and if, therefore, as I believe, certain portents to the contrary notwithstanding, the present condition of Europe and the East points to comparative repose, it seems to be additionally fortunate that it is decided to hold the next of the series in 1862.

By that time, also, the effects, beneficial, as I confidently anticipate, of the recent commercial treaty with France, and of others nearly concluded, or looming in the distance, will be fully known and appreciated. We desire a point of union, round which the energies of nations, satiated with the glories and the costs of war, may gather, and for this purpose what medium so natural and convenient as the proposed International Exhibition of 1862?

I am, &c.,

THOS. WINKWORTH.

Gresham Club, Jan. 9, 1861.

MECHANICS' INSTITUTIONS.

Sir,—The suggestion offered some time since by Mr. Barnett Blake, to make your *Journal* a medium for interchanging the experience of managers of Educational Institutes, has induced me to trouble you with some thoughts which have arisen from my observations of the progress of a Society formed for the promotion of Mental Improvement.

During the past few years, I have taken an active part in the management of such an Institution, and am perfectly acquainted with every step by which it has advanced to a state of great prosperity and usefulness; and my experience leads me to believe that, where Literary or Mechanics' Institutes become sickly and stunted, they are subject to evils similar to those which retard the growth and impair the health of many children, namely, bad nursing—unwholesome or unsuitable food—and light clothing. Or, to be plain, there is a lavish expenditure of money,—a want of attention to what some persons term trifles, but which are absolutely necessary for the preservation of order—the prevention of disappointment—the eradication of disease. A careless selection of books

for the library—thoughtlessness in the engagement of lecturers—no determination to provide that which is generally useful—but the simple securing of certain advantages for privileged classes; whilst ugly sectarianism is employed as a bandage to produce deformity and premature decay.

To secure a successful Institute, the very first things to be considered are, the objects for which such an organisation is required,—and what are they but the allurement (especially of youths and mechanics) from pleasures and scenes which might prove stepping-stones to poverty, disgrace and ruin;—the furnishing of attractive and useful employment for leisure hours;—the stimulation of a spirit of laudable emulation in literary, artistic, or scientific pursuits;—the provision of substitutes for immoral recreation;—the presentation of such objects as are worthy the pursuit of intelligence;—the expansion of the intellectual powers; the elevation of the human mind?

Such, in my humble judgment, is an outline of the great and noble work which Literary and Mechanics' Institutions should be designed to accomplish; and I am persuaded that, without a due appreciation of its importance, and an invincible determination on the part of the managers to keep it full in view, no gilded patronage, or any amount of funds, can ever ensure prosperity. The attempt to prepare a plan of operations which would be completely adapted to the requirements of every locality, would be perfectly futile; but there are some few hints in reference to libraries, committees, lectures, funds, &c., an observance of which has raised the Institution with which I have the honour to be connected, to a most satisfactory position; and I purpose in this letter offering those hints, with the sole desire that they may lead to such inquiry as shall result in the establishment of Societies where none exist, and in the revival of those that are languishing.

That which I conceive to be of primary importance, and which therefore cannot receive too much attention, is the library. Without it there can be no real success; to it every lecture and all class tuition should lead; by means of it the intellectual health of a neighbourhood is affected either for good or ill. And it should, therefore, be distinguished above all things for the excellency of its character. The great variety of opinion as to what constitutes a good library creates one of the greatest difficulties with which managers of Institutions have to contend. To surmount it there must be a clear understanding as to the class of readers for whom provision is to be made. If the Institution is designed for mechanics only, then it should be remembered that, for the most part, they have little time for reading, and that they cannot be expected to occupy their too small amount of leisure in wading through abstruse scientific disquisitions; nor, on the other hand, can the noble minds which many of them possess be satisfied with the attractions of a flimsy novel. Historical works, as those of Macaulay, and Prescott; books of travel, such as "Livingstone's Researches," and "The Voyage of the *Fox*;" biographical sketches, as the lives of Columbus, James Watt, Leigh Hunt, Douglas Jerrold, and George Stephenson; scientific works, in popular forms, as "Lardner's Museum;" and miscellaneous books, as "Self-Help," "Rides and Reveries of Æsop Smith," "Recreations of a Country Parson," may, in my judgment, be considered representative works of a library well adapted to a Mechanics' Institute. In a society consisting only of what may be termed educated people, who can afford to pay liberally for what they require, there will be, of course, the necessity of supplying literary and scientific works of the highest order; and where the subscribers are adults, there may, with propriety, be a sprinkling of what are termed first-class novels.

But if a society is to receive young people of the ages of thirteen and upwards, and if the subscription is so small as to enable all classes to avail themselves of the advantages offered (and I maintain this is the most useful of all kinds of Literary Institutes), then there should be the exclusion of those books which are usually classified as "works of fiction." I urge this upon the principle embodied in the old saying, "What is one man's meat is another man's poison." An educated man, endowed with moral excellencies, and plenty of that invaluable commodity, good "common sense," may occasionally read the works of Charles Dickens and other writers of fiction, and receive no injury whatever. He would know how to curb the disposition, which is so easily excited, to read such books excessively, but it is far otherwise with the youth of sixteen. Just at the period when his tastes and habits are being formed and strengthened, it is evidently a duty binding upon those who undertake to provide for his mental recreation and intellectual pursuits, carefully to avoid placing within his reach such literature as may either directly or indirectly give to him an unfavourable mental bias. He requires an agreeable, yet effective, bracing up to do battle with indolence and self-indulgence, impurity, and foppish display. From the shelves of the library there should be thrown upon his pathway rays of light, which will give increased radiance to every virtue, and scorch vice into blackness.

It must not for a moment be supposed that I am advocating an attempt to provide young men only with dull, heavy, serious reading; far from it, I would give them access to works of general interest, written in the most attractive style, but do not tempt them with that which would foster a desire to read nothing but works of fiction.

Between what are commonly called "good books," and those which we generally understand to constitute "light literature," there is a long and ever-increasing range of books, exceedingly attractive and highly recreative, and it is from this class that I would recommend the selection of libraries for such Literary or Mechanics' Institutes as are designed to benefit all ages and all classes of society. I am well acquainted with a library of this kind, and I have taken great pains to compare the circulation with that of libraries where there is a preponderance of works of fiction, and I find that the result of my calculations is considerably in favour of the course which I have described.

To render any library attractive, it must be borne in mind that there must be constant additions of new books, and copies of any work which is likely to be in great demand should be procured on the day of publication, and as soon after as possible second-hand copies should be purchased; want of funds will often prove a great hindrance here, but in another letter I shall attempt to show how easily such an obstacle may be removed. Let all books be neatly covered and numbered, and upon a label affixed to the side state the number of days allowed for reading—be liberal in this matter. Be careful in the appointment of librarians; they should be gentlemen noted for their punctuality, patience, perseverance, politeness, and painstaking. Their eyes should be quick to discern the condition in which books are returned, so that all necessary repairs be attended to as soon as required. And once a year (but only in the summer) the library should be closed for a few days, that stock may be taken, and soiled covers removed.

Attention to the foregoing, and especially to what I have ventured to write upon the selection of books, will, I am convinced, ensure success in the establishment of Literary or Mechanics' Institutes.

I am, &c.,

FREDERICK W. MONK.

Faversham, Oct. 15, 1860.

MODERN HOSE.

Sir,—Our worthy friend and associate, Mr. W. Bridges Adams, asks the men of Manchester and Leeds how to solve the question of getting good stockings of the best wool, &c. The question is easily solved, viz., pay a price for them, and order them in large quantities. Stockings, like steam-engines, sell best at low figures, by which the public pay the piper and the middle-men get the pence. A shopman, or dealer in goods of all kinds, orders showy goods

to sell at low figures; the manufacturer, of course, makes goods to suit his orders. Cent. per cent. is gained by selling imitation of wool stockings, and perhaps not more than 10 per cent. is gained by selling good wool stockings. The shopkeeper very naturally asks, Why should not I order the goods I get the most out of? and as Mr. W. B. Adams is an old manufacturer of steam-engines and first-class machinery, I have no doubt he was often cut-out of the trade by dealers selling lower than he could as a manufacturer. When some dealers order goods, they state fearlessly that they must have so and so, of certain sizes, and the quality must resemble the best goods; by which means he (the dealer) can come into the market and undersell a first-class manufacturer. This is the way that dealers make their fortunes, whilst manufacturers can scarcely earn a living, and the public do not get what they ought to have.

I am, &c., THOMAS DUNN.

Manchester, Jan. 8th.

Sir,—In reference to Mr. Bridges Adams's letter on "Modern Hose," and their almost universal rottenness, may I be allowed to remark that I felt somewhat scandalised some two years ago, when I listened at our Society to a paper on "Shoddy," and found that of the members present some considered shoddy rather a good joke, while others regarded it as an excellent illustration of British skill in using up waste materials. To me shoddy has always appeared an unmitigated sham; and when the poor of this country, believing that they are buying good strong cloth, are treated to shoddy, it seems a somewhat diabolical sham.

This sham, or shoddy, runs through almost everything one buys, and modern stockings form no exception.

I am glad, however, to say that this evil of rotten stockings may be shortly, to some extent, mitigated.

A lady has made some inventions in the manner of knitting stockings, so as completely to obviate the necessity of wearing garters, by which the comfort of all now wearing garters may be increased, and many cases of swelled ankles and varicose veins may be benefited.

It is in prospect to form a society in London to teach the knitting of these stockings to young children, either at school or out of school, so as to pay about sixpence a day to hundreds, if not thousands, of children now considered unfit for any kind of labour.

If this is carried out, and good knitting wool can be purchased, I think I can thus promise Mr. Bridges Adams and all such of Her Majesty's subjects as may desire a good-fitting and good-wearing genuine stocking, something very different to the rotten scarlet, purple, and other woollen hose which now adorn our pavements at the expense of the purses and tempers of all fathers and mothers of families.—I am, &c., GEO. WYLD, M.D.

PRESERVATION OF FOOD.

Sir,—Referring to Sir Charles Elliott's communication relative to the preservation of animal food, and fully recognising its importance and his excellent suggestions, I beg leave to mention a difficulty, which may perhaps be overcome. Fresh meat may be preserved good for a considerable time in an ice-well, and, if cooked directly it is withdrawn from the influence of the ice-pan, it will be an excellent dish for the table; but, if not cooked at once, it soon becomes tainted and unfit for food.

This fact may and will cause a difficulty in dealing with large stores of meat; the knowledge however, if made public, may lead some ingenious person to overcome it.

I am, &c.,

G. N. H.

Proceedings of Institutions.

Avenham (Preston) Institution for the Diffusion of Knowledge. — The Thirty-second Annual Report states that, in the proceedings of the past year, there is much to call for congratulation, for, in some important respects, the Institution has taken up a position much more satisfactory than could have been claimed for it in any previous year. In particular, it may be pointed out that the advance in the rate of subscription, sanctioned at the last annual meeting has now become established; and further, that a Government School of Art now forms an important feature in the Institution. The means of increased revenue, secured by the rate of advance in the subscription, cannot fail to be ultimately productive of the most beneficial results. For, great as may have been the success of the Institution hitherto, it has had to contend with a difficulty in its former insufficient rate of subscription, which had the effect of seriously crippling its usefulness. This difficulty removed, it has become now much more practicable to develop the entire capabilities of the Institution, capabilities which, though valuable in the highest degree, have remained in abeyance owing to the want of adequate means for their development. It is true that the immediate effect of the change in the rate of subscription has been to reduce the number of members, the number for the present year being 562 against 706, the number for the year previous. This, however, is not more than was looked for; and there is no reason to doubt that the ground thus temporarily lost will be more than recovered in the coming year. To the establishment of the School of Art the Council refer with peculiar satisfaction. This long desired addition to the usefulness of the Institution has been acquired without trenching upon the general funds; and further the school will, at no distant time, contribute to the pecuniary resources, as it already adds so greatly to the importance of the Institution. The usual evening classes have been in operation during the year, and have been, on the whole, well attended, the male classes especially, by students such as it is desirable to see in attendance, viz., young men from 16 to 25 years of age. Some o the students, having successfully passed the examination of the Institutional Association of Lancashire and Cheshire, were awarded prizes by the Association. These prizes the students had the gratification of receiving at the hands of the Right Honourable B. Disraeli, at the anniversary meeting of the association, held in the Free Trade Hall, in Manchester, on the 1st November last. Although the efficiency of the evening classes has been fully proportioned to the means the Council have hitherto been able to devote to their requirements, much yet remains to be done in the way of adding to their efficiency; and the present Council would suggest that the attention of their successors could hardly be given to a more important question than that of the development of the capabilities of the Institution for class instruction. In particular, it may be pointed out that it is exceedingly desirable that, in addition to the present classes, others should be attempted, especially classes for the study of history, political economy, and languages. Several lectures were delivered during the last season gratuitously. The library still continues to increase, though not so rapidly as to keep pace with the demands of the readers. The number of volumes at present on the shelves is 6,336. The number added during the present year is 204, of which seven have been presented, and 197 have been purchased by the Council. The reading room continues to attract a large attendance; and the high class literature, to be found in such abundance on the tables, finds numerous readers. The penny bank loses none of its interest with the public. On the contrary, a considerable increase is shewn, both of depositors and deposits. Although there has been no diminution in the supply of books and periodicals during the year, nor any lessening in any other way of the efficiency of the Institution, it will be seen, on reference to the accounts, that the balance at debit of the General Fund has been reduced from £69 3s. 6d., the amount at the beginning, to £58 3s. 11d., the present amount. A sum equal to nearly one-half of the amount

expended in books resulted to the funds of the Institution, as the proceeds of the Annual Soirée. Further additions to the year's income have accrued from the Class soirée held in the institution, under the management of the members of the female class, and from an entertainment given in the theatre of the institution by the Young Men's Elocutionary Society. The site of the institution has, during the year, been enlarged by the purchase of an adjoining plot of land. Through the liberality of the trustees of Goosnargh hospital, the owners, the land has been obtained on extremely favourable terms, and although the purchase entails an additional charge upon the funds of the institution, the necessity for the purchase was imperative. The institution still retains its connection with the Society of Arts, and the Institutional Association of Lancashire and Cheshire; and, at the suggestion of the Bishop of Manchester, it has also been placed in connection with the Arundel Society for Promoting the Knowledge of Art. The number of volumes issued from the library during the twelve months was as follows:—Arts and sciences, 1,464; Magazines (bound), 1,702; Voyages and travels, 1,358; History, 712; Biography, 945; Poetry and the drama, 599; Novels, 7,257; Miscellaneous, 1,007; Translations, 48. Total, 15,092. The state of the penny bank is as follows:—Accounts open Oct. 2nd, 1859, 1,826; Accounts open October 2nd, 1860, 3,029. Amount due on depositors' accounts, October 2nd, 1859, £391 2s. 10d.; Amount due on depositors' accounts, October 2nd, 1860, £620 19s. 7d.

Bucks and Berks Adult Education and Improvement Association.—The report for 1859-60, presented at the annual meeting, Thursday, June 28th, 1860, the Hon. and Rev. C. L. Courtenay, Canon of Windsor, in the chair, states that it is proposed to alter the name of the Association from the "Bucks and Berks Lecturer's Association," &c., to the "Bucks and Berks Adult Education and Improvement Association," which more distinctly expresses the objects proposed to be attained. There are at present in connection with the Association seven Institutes:—Windsor, Staines, Slough, Beaconsfield, Amersham, Chertsey (which joined it this year), Maidenhead. Eleven Reading-rooms and Libraries:—Burnham, Colnbrook, Eton, Cookham, Chalvey, Cumberland Lodge, Taplow, Windsor Working Men's Association, Wooburn, Clewer, Clewer-road; and six Class-rooms:—Cranbourne, Clewer-road, Shaw Farm, Windsor Working Men's Association, Windsor National School Night School, and South-place Night School. For all these the Association forms a bond of union by the Prizes offered for competition to the members and pupils, and the assistance rendered the teachers by the scale of gratuities. The operations of the Association are at present limited to the following branches:—1. The supplying of gratuitous lectures to the various class-rooms, reading-rooms, and Institutes in union. 2. The encouragement of night schools by gratuities to Institutes, and teachers, and pupils, according to its published scale. 3. The holding of an annual examination, at which prizes are awarded. 4. The acting as a local Board of Examiners in connection with the Society of Arts. There has been an increase of lectures during the past winter, the total number given by members being 32. Of this number 20 have been delivered by clergymen, and 12 by laymen. From returns of various night schools in connection (as far as they have come in) it appears that during the past winter there has been on the attendance roll of Windsor Working Men's Association, 53; Cranbourne, 30; Slough Drawing Class, 30; Windsor Drawing Class, 15; Iver Night School, 36; Shaw Farm Night School, 17; Wooburn Night School, 20; Colnbrook Night School, 47; Windsor National School Night School, 24; making a total of 272 men and lads attending from time to time, and to this may be added those attending schools from which no returns have been received. The prize of £2 to the Institute whose members having numbered 50, had the greatest number of pupils for classes in proportion to the number of members, was adjudged to the Windsor Working Men's Association. A prize of books was given to the pupil in each school who was absent fewest times from his class. The local examinations of the Association were held during the week commencing March 19. There were in all 48 candidates, and the following is a list of the various subjects:—Euclid, Arithmetic, Geography, History, French, English Grammar and Composition, Dictation, Practical Geometry, Drawing, Abstract of Lectures, Original Essay, Writing. In all the above subjects (save French and the Abstract of Lecture) prizes have been adjudged, and the answering was generally very creditable, and on some subjects evinced a decided improvement over the former year. With respect to the entire result of the Examination, the Committee feel cause for congratulation, not only on the progress made by the prizemen, but also on the more widely-extended interest felt in the matter. The Committee congratulate the Association on this being the first year that an Examination has been held by it in connection with the Society of Arts. It is true only two candidates presented themselves, but it is well even thus to make a beginning. The Committee hope that many more candidates will present themselves for these Examinations next year, and it is in contemplation to form the next prize scheme of the Association with special reference to that of the Society of Arts. An appendix is published to this report, in which notice is given that the following prizes, &c., are offered for competition for the season of 1860-1861:—I.—A gratuity of £2 2s. is offered to the Institute or reading-room, whose members having numbered fifty at any time during the winter, shall (in proportion to the number of members) have had the largest number of pupils attending classes. II.—For Attendance. *A.* A present of books to the pupil in each night school who shall have attended with most regularity during a course of not less than four months, the school being held at least three times a week. *B.* A money prize to the teacher of any school or class half of whose pupils have attended three-fourths of the entire course. *C.* A payment to the teacher of twopence per hour for every hour the classes are held. III.—For superior answering and proficiency at the annual examination to be held in March, 1861. *A.* 1. A prize of £1 to the member of an Institute, reading-room, adult class, or night school, who shall pass with most credit an examination in the following subjects, viz.:—Arithmetic (simple and compound rules), geography, history, English grammar, writing from dictation, composition. 2. A prize of 10s. to second best in above. 3. 7s. 6d. third. *B.* 1. A prize of £1 to the best answerer in Euclid, mensuration, practical geometry, arithmetic (advanced). 2. A prize of 10s. to the second best answerer in above. *C.* A prize of 10s. to the scholar of a night school whose writing shall show the greatest improvement during the season. (The improvement to be judged of by copy books selected by the manager of the school.) *D.* A prize of 10s. to the scholar of a night school or class who shall answer best in the first four rules of arithmetic, and who is certified by the manager of the school or class as unable to compete in the higher classes. (If there are a sufficient number of candidates a second prize will be adjudged.) *E.* 1. A prize of 15s. for drawing from casts. 2. A prize of 15s. for drawing copies in outline. 3. A prize of 10s. for drawing architectural designs (copies). 4. A prize of 15s. for drawing architectural designs (original). *F.* A prize of £1 for the best translation from French into English, and English into French. *G.* A prize of £1 for best abstract of a lecture or course of lectures, delivered in the Institute or reading room during the season 1860-61. Due notice of the days of examination in March or April will be given, and the papers forwarded. No candidate who has obtained the first prize in any year can be allowed to compete again in the class in which the prize has been obtained, but may be examined in it for a "passed" certificate to the Society of Arts examination.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Geographical, 8½. Mr. J. M‘Douall Stuart, "Journal of the Expedition across the centre of Australia, from Spencer Gulf on the South, to latitude 18° 47′ on the North."
Medical, 8½. Clinical Discussion.
Tues. ...Civil Engineers, 8. Continued Discussion upon Mr. Preece's Paper, "On Submarine Telegraph Cables."
Statistical, 8. Prof Leone Levi, "On the Progress of the Public Expenditure of the United Kingdom."
Pathological, 8.
Wed. ...Meteorological, 7.
London Institution, 7.
Society of Arts, 8. Dr. Edward Smith, "On Recent Experimental Researches on the Nature and Action of Alcohols as Food."
Thurs...Roy. Soc. Club, 6.
Linnæan, 8. 1. Mr. M. T. Masters, "On Prolification in Flowers." 2. Dr. Welwitsch, "On the Botany of tropical Western Africa."
Chemical, 8. 1. Dr. Noad, "On the Analysis of the Saline Water of Purton, near Swindon, North Wilts." 2. Prof. Bloxam, "On the Electrotype Test for Arsenic."
Royal, 8½.
Antiquaries, 8½.
Fri. ......Royal Inst., 8. Prof. Tyndall, "On the Action of Gases and Vapours upon Radiant Heat."
Sat. .....Asiatic, 3.
Royal Inst., 3. Prof. Tyndall, "On Inorganic Chemistry."

PATENT LAW AMENDMENT ACT.

Applications for Patents and Protection Allowed.

[*From Gazette, January 4th*, 1861.]

Dated 13th October, 1860.

2491. M. Strang, otherwise Hutchison, Glasgow—Imp. in the manufacture of lubricating oil.

Dated 29th November, 1860.

2928. Sir J. T. Bethune, Bart, 39, Rue de l'Echiquier, Paris—Imp. in the production of motive power by application of the dead weight of liquids, and in the apparatus connected therewith.

Dated 1st December, 1860.

2947. A. Jackson, Liverpool—Imp. in generating steam as adapted to a certain arrangement or construction of steam engines for transmitting motive power.

Dated 8th December, 1860.

3016. L. Simon, Nottingham—Imp. in heated air engines.

Dated 15th December, 1860.

3083. Lieut. N. C. Barton, R.N.—An improved scaling ladder for military, naval, and other purposes.
3085. G. Davies, 1, Serle-street, Lincoln's-inn—Certain imp. in rolling and corrugating plates of metal, and in machinery or apparatus employed for such purposes. (A com.)
3087. J. G. Williams, Blaenavon, Monmouthshire—Imp. in extracting inflammable and other noxious gases from coal and other mines.
3089. A. Prince, 4, Trafalgar-square, Charing-cross—Imp. in steam-engines. (A com.)

Dated 17th December, 1860.

3095. R. Bodmer, 2, Thavies-inn, Holborn—Imp. in machinery or apparatus for preventing or modifying the effects of collisions on railways. (A com.)
3097. A. Denny and E. M. Denny, Waterford, Ireland—Imp. in apparatus for singeing the carcasses of dead pigs.
3101. T. W. Walker, Poole, Dorsetshire—Imp. in the manufacture of ornamental bricks, tiles, and other articles of a similar nature, and in the machinery or apparatus employed therein.

Dated 18th December, 1860.

3103. E. Silas, 4, Leicester-place, Leicester-square—An aerostatic signal apparatus, to be called "Semasphere."
3107. R. W. MacArthur, 38, Chapel-street, Belgrave-square—Hulling and dressing rice and other grain. (A com.)
3109. R. A. Brooman, 166, Fleet-street—Imp. in spears for cutting sheet metal and other materials. (A com.)
3111. J. Paterson, Wood-street—An improved neck-tie.

Dated 19th December, 1860.

3115. J. W. McGauley, Pimlico—Imp. in means or apparatus for preventing collisions on railways.
3117. O. Blake, Southampton-street, Strand—Imp. in the manufacture of that description of glass termed plate glass.
3119. M. Henry, 84, Fleet-street—Imp. in the manufacture of colours applicable for various uses in arts and manufactures. (A com.)
3121. R. A. Brooman, 166, Fleet-street—Imp. in the treatment of caoutchouc, and the employment of a product obtained thereby, for lubricating and coating bodies. (A com.)
3123. C. W. Robinson and J. Robinson, jun., Mount Kennett, Limerick, Ireland—The singeing of the hairs off pigs after being killed, without letting the flames or smoke from the fires come in direct contact with the pig.

Dated 20th December, 1860.

3127. J. Clarke, jun., Longford-street, Rochdale—Imp. in warping.
3129. G. Hadfield, Carlisle—Imp. in the preparation of wood for conversion into casks or barrels, and in machinery to be used for that purpose.
3131. F. B. Baker, Sherwood-street, Nottingham—Imp. in the manufacture of lace.
3133. E. Whitehall, Nottingham—Imp. in machinery for embroidering on lace and other fabrics.

Dated 21st December, 1860.

3135. W. Price, 4, Wood-street, Lambeth—Imp. in the manufacture of articles called shives, tits, bungs, and corks, or other conical bodies, whether made out of wood, cork, or any other substance.
3137. H. Loveridge, Wolverhampton—Imp. in meat screens.
3139. T. Moore, 33, Regent-circus, Piccadilly—Imp. in navigating ships.
3141. T. Hunt, Crewe, Chester—Imp. in apparatus for supplying steam generators with water.
3143. J. Glover, Dane's-inn, Strand—Imp. in mounting and affixing opaque letters or numerals on a translucent ground.

Dated 22nd December, 1860.

3145. J. Johnston, 1, Pond-street, Hampstead—Imp. in apparatus for withdrawing corks from bottles.
3147. H. Hughes, Loughborough, Leicestershire—An improved method of making wheels for carts, waggons, and carriages for common roads and railways.
3149. T. B. Marshall, 41, Queen-street, Cheapside—Imp. in wind musical instruments.

Dated 24th December, 1860.

3155. C. H. Adames, Birmingham, and C. Whitehouse, Wolverhampton—A new or improved mode of manufacturing frying-pans, and other articles produced from sheet iron or other metals.
3157. J. A. Fanshawe and J. A. Jaques, Tottenham—Imp. in the manufacture of fabrics with rubbing or friction surfaces.
3159. J. L. Norton, 38, Belle Sauvage-yard, Ludgate-hill—Imp. in apparatus for drying wheat, barley, and other grain and seeds.

Dated 26th December, 1860.

3161. F. Puls, 25, Francis-terrace, Hackney Wick—Imp. in obtaining products from coal, gas tar, gas pitch, coal tar, asphalte, resin, and other bituminous and resinous substances.
3163. S. Desborough, Noble-street, and S. Middleton, Essex-street, Strand—Imp. in the manufacture of boots and shoes, and in the means and apparatus employed for uniting and preparing surfaces of leather and similar materials for this and other purposes.
3165. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in smoothing irons. (A com.)

Dated 27th December, 1860.

3167. F. Sage, 11, Hatton-garden—Imp. in brackets for carrying trays, shelves, glass cases, &c., in windows and glass cases.
3169. J. T. G. Stone, Gopsall-street, Hoxton—An improved method of covering steel used for ladies' crinolines, and other articles of dress.
3171. T. V. Guerrée, L'Aigle, France—An apparatus for moving waggons or carriages on railways.
3173. R. Parnall and H. Parnall, Bishopsgate-street Without—Imp. in means for promoting warmth and comfort in railway and other travelling.
3175. G. Dodman and W. Bellhouse, Rochdale—Imp. in thoists.

Invention with Complete Specification Filed.

3193. B. Nadault de Buffon, 28, Rue des Saints Pères, Paris—Imp. in apparatuses for clarifying and purifying water and other liquids.—31st December, 1860.

Patents Sealed.

[*From Gazette, January 4th*, 1861.]

January 2nd.

1620. J. Savage.
1627. J. Ogden.
1654. W. H. Pritchard.
1665. E. Franquinet.
1783. W. Clark.
1882. W. E. Newton.
1884. W. E. Newton.
2717. W. Hewitt.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, January 4th*, 1861.]

January 1st.

58. J. P. A. Couder.

January 2nd.

16. J. Leeming & J.C. Ramsden
181. J. Childs.

[*From Gazette, January 8th*, 1861.]

January 3rd.

14. J. Ellis and J. H. Ellis.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, January 4th*, 1861.]

January 2nd.

8. H. L. Corlett.
27. J. Mason and L. Kaberry.
47. R. A. Tilghman.
369. G. F. Wilson.

[*From Gazette, January 8th*, 1861.]

January 3rd.

17. J. Bernard.

Journal of the Society of Arts.

FRIDAY, JANUARY 18, 1861.

EXAMINATIONS.—LOCAL BOARDS.

Those Secretaries of Institutions who have not already forwarded Lists of their Local Educational Boards are requested to do so as soon as possible, not omitting to specify the Chairman and Secretary.

Copies of the Programme of Examinations for the present year may be obtained by members of any of these Boards on application to the Secretary of the Society of Arts. In this will be found full instructions for their guidance in making the necessary arrangements for co-operating with the Society of Arts, but should there be any point requiring explanation, the Secretary will be happy to afford it.

SIXTH ORDINARY MEETING.

Wednesday, January 16, 1861.

The Sixth Ordinary Meeting of the One Hundred and Seventh Session, was held on Wednesday, the 16th inst., T. King Chambers, Esq., M.D., Member of the Council, in the chair.

The following gentlemen were proposed for election as members of the Society:—

Aldridge, R. W.	The Avenue, Denmark-street, Camberwell, S.
Allen, Thomas	Upton-cottage, Macclesfield.
Beale, James	11, Wellington-place, Cork
Boden, Henry	Ednaston-lodge, near Derby.
Borries, Christian	Newcastle-on-Tyne.
Breillat, E.	Murdoch-villa, Coburg-road, Montpelier, Bristol.
Cammell, Charles	Norton-hall, near Sheffield.
Chesterfield, Earl of	3, Grosvenor-square, W., and Bretby-park, Burton-on-Trent.
Clayton, Thomas	South Stainley, Ripley, Yorks.
Cocker, Joseph R.	Belle-vue, Hathersage, near Sheffield.
Cooper, Major William Cooper	Toddington Manor, Dunstable, Beds.
Dickinson, Peter	Holland-house, Vassall-road, Brixton, S.
Euing, William	209, West George-street, Glasgow.
Hamilton, Edward Wm. Terrick	32, Upper Brook-street, W.
Harris, Henry	Heaton-hall, near Bradford.
Heaps, John Knowles	Leeds.
Henderson, John	Hungerford Wharf, Strand, W.C.
Higginbotham, Samuel	Glasgow.
Howard, Edward C.	Brinnington-hall, Stockport.
Hunt, Thomas	Bridge-street, Banbury.
Kay, John Robinson	Walmesley-house, Summerseal, near Manchester.
Lyons, M.	143, Suffolk-street, Birmingham.
Mitchell, C.	Low Walker, near Newcastle-on-Tyne.
Morrison, Robert	Ouseburn Engine Works, Newcastle-on-Tyne.
Muspratt, Frederic	Woodend Chemical Works, Runcorn Gap, Warrington.
Napier, Robert	West Shandon, Glasgow.
Neville, Samuel	Ellison Flint Glass Works, Gateshead-on-Tyne.
Oakes, John	Riddings-house, near Alfreton.
Pierpoint, Benjamin	St. Austin's, Warrington.
Platt, John	Oldham.
Radcliffe, John	Lower-house Mills, Oldham.
Richardson, E. Junr.	3, Lovaine-place, Newcastle-on-Tyne.
Robb, Alexander	79, St. Martin's-lane, W.C.
Smith, Samuel	6, Upper Westbourne-terrace, Hyde-park, W.
Sowerby, John	Ellison Flint Glass Works, Gateshead-on-Tyne.
Straker, John	Willington-house, Durham.
Turner, Robert	32, Grey-street, Newcastle-on-Tyne.
Wotherspoon, William	46, Dunlop-street, Glasgow.
Young, J. W.	64, Gordon-street, Glasgow.

The following candidates were balloted for and duly elected members of the Society:—

Bacon, Jacob Perkins	69, Fleet-street, E.C.
Brown, Henry	Market-street, Bradford.
Cheere, Robert	31, York-terrace, Regent's-park, N.W.
Clifton, Edward Norton	47, Upper Harley-street, W.
Jeffery, Wm. S.	9, Regent-street, S.W.
Morley, Henry	4, Frederick-villas, East Brixton, S.
Pike, Ebenezer	Cork.
Roberts, Joseph	7, Old Jewry, E.C.
Whichcord, John	16, Walbrook, E.C.

The following Institution has been received into Union since the last announcement:—

Carlisle, Young Men's Christian Association.

The Paper read was—

RECENT EXPERIMENTAL INQUIRIES INTO THE NATURE AND ACTION OF ALCOHOLS AS FOOD.

By Edward Smith, M.D., LL.B., F.R.S, Assistant-Physician to the Hospital for Consumption and Diseases of the Chest, Brompton, &c.

I have undertaken to ask you to consider to-night the subject of alcohols, in the belief that no other is more worthy of your attention, for it is one in which all are interested, both as individuals and as members of a community. The moral, physical, intellectual, and monetary character of a nation is as certainly bound up with it as is the health, domestic comfort, and social status of its individual inhabitants; and perhaps there is no other single subject of which this could be so truthfully said.

I am also induced to take this step because I feel that there is much error in the opinions held both by those who support and those who vehemently oppose the use of alcohols, which it is desirable to correct so far as increasing knowledge may enable us to do so; and, as a further plea, I may mention that science is now setting aside some of the views which she has hitherto promulgated, and is adopting others which seem by recent experiments and inquiries to be better founded.

I am, however, fearful lest you should have become so familiar with the subject and so impressed with the irreconcileable opinions which you have heard expressed, that it may no longer interest you; but although it is thousands of years since its evils were first known and protested against, and throughout intervening ages it has had great nations as its admirers, and equally great communities as its pledged objectors, it does not show that the subject

is now exhausted, but only how much truth lies on both sides.

In taking it up in a simple spirit of truth, and without any known bias in either practice or pledge, to draw us unduly in either direction, I trust that we may find that a new consideration of the action of a substance of the most general use, upon which an incredible amount of money is yearly spent, both by the poor and the rich, which has potent powers most liable to abuse, and about which there is so old standing a difference of opinion, may not be without advantage. The subject is however as vast as it is important, and has so many ramifications which should interest us, that it is necessary *in limine* to make a selection, and to lay down defined limits for the evening's discussion. There are many here who look upon it in a national, others in a moral, and others in a social point of view, and who could doubtless treat it in these respects much more efficiently than I could; but there is one question which clearly underlies all others—one which must guide all others, and to which I have given a prolonged attention, which may be sufficiently discussed in the brief space of time allotted to us, viz., the nature and the mode of action of alcohols. If we could arrive at correct and extensive views upon this question we should certainly have greater unanimity of opinion in reference to the larger bearings of this subject—unanimity and truth where there are at least seeming diversity and error—an object which is the end of all inquiries.

The plan, therefore, which I propose to adopt, is to consider, in as few words as possible, the three prime articles of belief amongst scientific men, and then to append a few subsidiary observations which naturally associate themselves with the principal subjects.

The three statements for discussion are the following:—

1. That the presence of alcohol in the many members of the class of alcohols gives a common character to the whole, and is *the* efficient agent in their action.
2. That alcohol is consumed in the body, and produces heat.
3. That alcohol lessens the waste of the body.

These will embrace the leading points, both in the scientific and the popular knowledge of the subject.

1. The assertion that alcohol gives a common character to and is the sole efficient agent in the members in the class of alcohols:—

In expressing my disbelief in this first statement, I do so with confidence, for I can appeal to the common practice of mankind—to facts with which every one is familiar, and which, however much they may have been disregarded, disprove the assertion in the most infallible manner. The practice of mankind is instinctive, and therefore based upon truth, whilst the researches and reasonings of men need correction, and hence the former is the test by which the truthfulness of the latter must be judged.

If alcohol be the efficient agent in alcohols, why is it that, after so much experience, we have not been induced to use pure alcohol alone, and dilute it to the extent to which we dilute strong spirits, or in which we find it in wines and ales? This would surely be the readiest and the most rational procedure. Why is it found that new whisky is avoided by our northern neighbours, who are the best judges and most unsatisfied consumers of that liquid? Why are new wines discarded by the intelligent members of the neighbouring clubs in Pall-mall, seeing that they contain more alcohol than is found in older samples? Why does the hot whisky, strong in alcohol, which on the banks of the Ohio is sold at a few cents. per gallon, make the poor Red Indian (to whom it is bartered) frantically and furiously mad? Or, why will the raw whisky and the rough strong common wines sold in this country, give headache and general derangement of the system in the morning, when greater quantities of what are called purer spirits and wines might have been drunk with impunity? Why do we, in selecting our wines, watch the oil trickling on the sides of the wine-glass, and carefully seek for a fragrant, full-bodied aroma, which gives us more pleasure than even the tasting of the wine? Why does the price of wine differ so greatly, apart from the amount of alcohol which it contains, and apart also from the supply of the wine or the year of its age? Why are the wines of certain vintages preferred to others? and, in general, why are vintage wines preferred to mixed wines? These are matters of hourly observation and of universal practice, and there must be valid reasons for them.

Why, again, do we object so strongly to the rough raw spirit which is found in the Cape wines, and why the objection which has recently been taken by the French Government to the use of inferior spirit in the manufacture of Cognac? Why, indeed, do we use the term "inferior" spirit at all if the amount of alcohol be the only test of its value? Why, again, do some persons prefer spirits, others wines, and others ales; and why is there so infinite a variety of tastes on such minute matters? The instinctive experience of mankind has pointed out the quantities of each which will produce an effect upon the consciousness, for whether it be one glass of spirits and water, or one to two pints of ale, or half a bottle of wine, it will contain the same quantity of alcohol, and hence these are recognised as the proper limits of a moderate drinker, but why the diversity in the choice, if the alcohol be the efficient agent?

Then, again, see the amount of popular knowledge as to the effects of these various substances, all of which, when taken in the usual dose, contain the same amount of alcohol. Let us take men who drink these fluids, but who are sober men, and can we not distinguish the gin-drinker from the beer-drinker? The former is a pale, haggard, emaciated, feeble, morose, creature, whilst the latter is a man of full habit, florid, and more genial. Then where shall we range the brandy and rum drinkers? It is well known that in the West Indies the decanter of fine old rum is kept upon the side-board, and any one entering the room may take a quantity diluted with water at any time of the day; and notwithstanding this he looks healthy and is hearty; but let a man, thus accustomed to rum, begin to drink brandy, and within a few weeks his friends perceive the change, from his altered aspect and manner. Why is rum the grog of our sailors, and of those of all civilised nations? Surely in America at least whisky can be made most abundantly and at a less price than rum; and although rum was introduced into the Navy as being the cheapest spirit, it is probably not so now. What would be the effect upon our jolly, care-nothing, muscular sailors, if they were supplied with gin instead of rum, but to remove from them the hearty aspect of the ale-drinker, and give them the appearance and strength of the emaciated wretches who haunt the corners of the streets?

We not only select, and that with the greatest nicety, the various kinds of alcohols which we prefer, but the effect upon the feelings, the aspect and the health of the system differs with each member of this class. This is popular knowledge and practice—based upon instinct rather than upon reason; for if you ask for the reason, the only answer you can obtain is the instinctive one that "I like it best," or "it agrees best with me." It is not a question of how much alcohol is contained in these substances (except within certain limits), and yet on scientific grounds the rational distinction should be the amount of alcohol.

Neither is it altogether a question of taste, for if it were so we might turn to a body of gentlemen who are not reputed to care much about the taste of the agents which they employ, and ask why the medical practitioner does not give alcohol alone in the cases in which he judges it right to administer some member of this class. We know that he does not do so, but on the contrary selects with the greatest care that member of the class, which in his judgment is especially fitted for his case and will direct you as to even the kind of ale which you should take, and attach great importance as to whether you must drink port or

sherry wine, when each will contain, as he knows, the same amount of alcohol. In doing this he is partly guided by his instinct, for it is commonly alleged that medical men recommend that which they like themselves, but it is in other parts based upon reason, for he has seen different effects follow their use.

In asking you to reflect upon these various questions may I not assume that it is clear to every one, almost without consideration, that men do recognize the fact that there are other important agents in alcohols than alcohol; and is it not probable that alcohol has attracted the chief attention of both scientific and non-scientific persons, because of its power to affect the consciousness, whilst the effects of other agents are less prominent? It is also true that whilst alcohol may be readily obtained from alcohols, and its presence proved by certain physical properties, the other agents have been but very imperfectly studied, and at this day are classed under the general expressions of volatile oils and ethers.

That alcohol itself is not a simple and uniform fluid, is known to every distiller, for whilst the finest is produced early, and is used in the manufacture of scents, and the next quality is, or should be employed in the manufacture of brandy and gin, and used in medicine, the product of the last hours of distillation is consigned to the makers of varnish. It is true that the first samples contain more alcohol than the latter ones, but that is not the real distinction. The flavour varies with the hour of distillation, and at the end a large quantity of fusil oil and free acid is found mixed with the alcohol as it leaves the still. The effects of the fusil oil have not been determined, but it is known to be one of the substances found in all raw, rough spirits, which produce headache.

Hence there is a practical but unexpressed belief that, however important alcohol may be in the various members of the class of alcohols, there are other substances associated with it of no less importance.

This quite accords with the results of my own experiments upon the human system, for I have shown that alcohol alone, and each member of the class of alcohols, has its own degree and even kind of action.

The plan which I have adopted in these inquiries has differed from that pursued by my predecessors, in the following particulars:—In former inquiries the substance was taken in doses unusually large or unusually frequent, and with various kinds of food, also at different periods of the day, and with varying degrees of exertion, and hence it was very difficult to dissociate the influence of the other agents from that under inquiry, and even yet more difficult to obtain a standard with which to compare the results. With a view to avoid these difficulties, I selected the morning time, before breakfast, for the inquiry, when the system was very sensitive, and when no influence of food existed; and by making the experiments in perfect rest, it appeared that all interfering agencies were removed, and the effect of the alcohol was perfectly isolated. We also obtained a correct standard with which to compare the result, viz., the amount of chemical change which occurred immediately before the fluid was taken. Hence, as the methods of inquiry have differed so greatly, it cannot surprise if the results obtained should differ also. The direction of my inquiries has been that of the effect of alcohols over the respiratory functions, and the diagrams which are on the walls exhibit the results at which I have arrived.

Alcohol itself, when taken in doses of 1½oz. (a small wine-glass full), diluted with 6oz. of cold water, almost always increased the amount of carbonic acid evolved, but only in a very moderate degree; the greatest increase varied from about half a grain to one grain per minute, but the average increase during the inquiry was from one-eighth to one-half a grain per minute. When a small dose (half an ounce) was repeated every quarter of an hour, the effect was more uniform.

Rum had a similar but a more decided action, for in one experiment there was an increase of two grains of carbonic acid per minute upon one of the persons; when repeated in small doses its action very much resembled that of alcohol.

Brandy and Gin, in nearly every experiment, lessened the amount of carbonic acid expired, and the latter to the remarkable extent of nearly 1¾ grains per minute in one experiment. The diagrams exhibit much variation during each inquiry, and upon different persons—but the general results were as just stated.

Whisky varied much in its action, notwithstanding that in this, as in all other inquiries, we drank alcohols of more than average quantity. Generally, it lessened the respiratory changes, but with a very manifest tendency to return to, or to exceed, the latter quantity.

Wines, when taken in doses of 3oz., without water, produced but little effect, but commonly there was an inconsiderable increase.

Old Ale and Stout, in half-pint doses, always caused a sustained increase of about ¾gr. per minute for about two hours, and although the general effect was less than that of rum and milk, it was (in the small quantities just mentioned) greater than that of alcohol or wine.

We investigated the action of the aromas of fine wines and spirits, by inhaling them, and in every instance found that they lessened the respiratory changes, but how far this might be due to a local action on the lungs, by their direct application to the surface, we cannot tell.

From these experiments it is clear that alcohols have an influence over the respiration—that this is diversified with the substances employed and the persons experimented upon, and that the effect of alcohol does not measure the effect of all alcohols. Hence we have proof that there must be other active agents in them than alcohol, and must call in the aid of the chemist to investigate more closely their composition. The uniform and conservative influence of the aromas of wines illustrates well the value which is attached to age in wines—a condition under which alcohol is lost and aroma gained. It also attaches an importance to the evil of manufacturing wines much higher than that of a mercantile fraud, for such composition cannot have this truly essential quality of wine when acting upon the system—an action, it will be observed, the reverse of that of the alcohol. I need not remind you that although we do not know the chemical composition of the aromas of flowers, we know that they are powerful agents. To many the scent of the rose, and the jasmine, and the wall-flower is very exhilarating, but to others it causes faintness; and in all persons the continuance of the influence is very apt to produce headache; whilst various chemical preparations emit odours of even a fatal tendency; and hence we need have no *primâ facie* difficulty in believing that the choice, full-bodied aromas of wines exert considerable influence on the human system.

Beers contain two substances, in larger quantity than is found in wine, which we have shewn to have the effect of increasing the respiratory changes, viz., sugar and gluten. The diagrams show that sugar has an influence which is great and rapid, both in its rise and fall, while gluten acts moderately and with great uniformity. The degree of action of the former is greater than that of beer, whilst that of the latter is very similar to it. I have elsewhere endeavoured to show that this action upon the respiration is not direct, but it is clear that the gluten, at least, causing the loss of more carbon than it supplies, must have the power of promoting the digestion or ultimate transformation of other food. Hence it will appear that the difference in the actions of beers from spirits, and of wines from alcohol, may be in part explained; and that instead of one, we have at our command a number of powerful agents, however imperfect our knowledge of them may at present be.

2. I now proceed to consider the second statement, viz., that alcohol is transformed in the system, and produces heat. The importance of this statement is that it is equivalent to affirming that alcohol is a true food, and with it is

associated nearly all that physiology can say for or against its general use.

We may, in a few words, describe the grounds for the chemical view thus expressed.

There are two principal excretions from the body, one composed chiefly of nitrogen, and the other of carbon. There are likewise two great divisions of food taken into the body, one containing carbon principally and the other nitrogen, with a small amount of carbon. The body itself is composed of structures which contain nitrogen, as the muscles, and of fat which does not contain nitrogen but is rich in carbon; and lastly there are two prime processes in the system, by one of which, or the combustion of carbon and hydrogen, the body is warmed, and by the other, viz., the transformation of nitrogenous materials, it is nourished and repaired. Hence, then, it seems that the nitrogen taken in food is to be associated with the nitrogenous tissues of the body, and both are to pass out in the excretion of nitrogen, whilst the carbon and hydrogen in food are associated with the fat of the body, and both being burnt, pass out by the lungs as carbonic acid and water. The former class of foods, viz., the nitrogenous, have hence been called "flesh-formers," and the latter "heat-formers." Such is a bird's-eye view of the general question.

Now alcohol consists of carbon and hydrogen with oxygen, and hence has all the elements of the one class of foods. Moreover it has a special attraction for oxygen, and when its elements unite with oxygen, whether in or out of the body, evolution of heat occurs; and as in respiration oxygen is introduced into the system, there is a presumption that it does unite with the carbon and hydrogen thus offered to its action. Then if to this we add the fact that starch, the basis of our farinaceous food, also composed of carbon and hydrogen with oxygen, is certainly united with oxygen in the system; and finally, that although alcohol is taken into the body, it has not been proved to pass out of it, we seem to have a demonstration that it is consumed in the system, and does cause the evolution of heat.

I do not stay to say that these theoretical views of nutrition are now undergoing a change, so that whilst the outlines may remain, it is probable that it will be shown that the distinction of heat-forming and flesh-forming matters is not so cleanly marked as the theory assumes, but that the two kinds are mutually dependent upon each other. Neither need I advert to the fact that, as heat is produced from every chemical change, it will follow the conversion of nitrogenous as well as of carbonaceous compounds; but I will state the circumstances which militate against the view of the conversion of alcohols within the system:—

1. After alcohol has been taken, it may be obtained from some parts of the body, as the brain, in the state of alcohol unchanged for thirty-six hours afterwards.

2. MM. Lallemand, Perrin, and Duroy have, within a few months, shown that alcohol may be detected in the breath, the perspiration, and other excretions for at least eight hours after a moderate dose has been taken. This is almost the "missing link" which all have sought for who have disbelieved the chemical theory, but it is not quite perfect. You will perceive, from the experiment now before you, that my friend, who took 1½ ounce of alcohol half an hour ago, by breathing through this solution of the bichromate of potass, in strong sulphuric acid, causes the colour to change from red to green. This is the ground for the statement just made. These French gentlemen have not procured the alcohol as such from any of the excretions, but they prove its presence by this reaction; neither have they been able as yet to show that the quantity of alcohol which thus leaves the body is proportionate to that which entered it. The value of the test rests upon the fact that no element in the respiration, when alcohol has not been taken, will produce this change; and that no transformation of alcohol—as, for example, into the allied substance, aldehyde—will cause it; and as these facts are said to be true, it is affirmed that the change must indicate the presence of alcohol in its own form and properties. This is a new and most interesting discovery; and, although its results are not complete, and require confirmation, I ask you to bear it in your memories. The above authors proved the transpiration of alcohol from the skin of a dog, but I am happy to have the opportunity of showing you an experiment, which has never before been performed, namely, the enclosing in an air-tight bag the arm of a gentleman who had previously taken 1½ oz. of alcohol, and passing a current of air through the bag into the above-named test liquid.

Hence we seem at once to have cut the ground from under the feet of the chemical theory which previously appeared to be so conclusively established, and have proved that alcohol is not transformed, does not produce heat, and therefore is not a food. But long before this demonstration appeared, my experiments fully convinced those of us who were experimented upon that alcohol is not a food. The volatile elements or aromas with which it is associated in wines and spirits could be perceived in the excretions, and an alcoholic smell is well-known to exist in the breath of those who have drunk alcohols. Its mode of action upon the general system was not in the least like that of a food. The diagrams before you, although showing the general results upon the respiration which I have described, show, at the same time, how much difference in the degree of effect was found in each experiment of the same series, instead of the uniform and steady increase and decrease which mark the action of true foods. It did not in any degree satisfy the appetite, or give that sensation which marks the supply of nutriment. It is true that heat was felt after taking alcohols, but after a short time the sensation of cold was even greater—a sensation often sudden and distressing, and both were quite apart from the temperature of the external air. During its action, there was at first excitement of the spirits, but from the first there was relaxation and want of tone, and indisposition to use the muscles. After the action upon the consciousness had subsided, there was none of the vigour and healthful warmth which are found at the same period after a meal, but languor, lassitude, *malaise*, and misery. I will transcribe the notes of the effects in one or two experiments, with the period at which they occurred after the introduction of the spirit, again reminding you that all the experiments were made upon an empty stomach in the morning.

After taking 1½ ounce of alcohol in May, it is recorded as follows:—In 6 minutes, giddiness; in 10 minutes, violent inspiratory efforts and greater giddiness; in 13 minutes, more blood sent to the skin, as shown by heat, fullness, and swelling of the hands and face; in 15 minutes, very great giddiness; in 25 minutes, oppressiveness, heat and fullness of the head, whilst at the same time general chilliness, relaxation of the muscles, heaviness of the hands, indisposition to move a finger, and lessened power of controlling the muscles; in 23 to 28 minutes, there was the full effect; in 30 minutes we felt relieved, and there was a semi-cataleptic state, or one in which it was pleasant to leave the finger or any part of the body just where it might happen to be; stiffness of the forehead. In 43 minutes, consciousness quite regained, expiration still constricted; in 44 minutes, there was a sense of fullness at the top of the head; in 54 minutes, there was a sinking, unpleasant sensation at the stomach, and oppressed expiration, but muscular control was regained; in 58 minutes, the inspiration was much less violent; and in 71 minutes, all that remained was an unusual sensation at the stomach, and tingling at the top of the head.

A friend, who was also experimented upon, recorded that the skin was dry, as if exposed to an east wind.

In another experiment with fine old rum, taken in April, the effect was noted as follows:—

In 4 minutes, slight giddiness; in 8 to 13 minutes, dryness, and soreness on the tip of the tongue, lessened muscular power, stiffness of the face and hot hands; in 15 minutes, talkativeness and merriness; in 20 minutes, dreaminess; in 25 to 30 minutes, a purring or continuous buzzing sensation through the whole body, and a pumping sensation in inspiration, as if the quantity of air in-

spired was really greater than it proved to be. About this time was the greatest effect; the expiratory power was enfeebled, and the skin was hot, harsh, and dry. My friend was happy and hilarious, with his good-natured face glowing like a fire, beaming with happiness, and tears trickling down his cheeks; in 42 to 47 minutes, the influence was a little lessened, the inspiration perhaps a little shorter, and the influence upon expiration was increased; in 50 minutes we became, first, more taciturn, and then miserable; in 56 minutes, the influence was greatly lessened; in 61 minutes, a general sensation of cold; in 85 minutes, the consciousness was clear, but in two hours the effect had not passed away.

Now, apart from all other questions, may we not remark how different are these results from those following a meal of ordinary food; and were we wrong, think you, in stating that alcohol is the great, not alimenter, but disturber of the system?

We certainly arrived at the conclusion that it does not in any way act as a true food, that it does not produce heat by its transformation, and that it passes out of the body as alcohol or some very analogous compound.

But the fact remains that during a period in the action of alcohols there is increased sensation of heat. This may arise from either of three causes, viz., 1st, Increased production of heat whilst the rate of dispersion is constant; 2nd, Diminished rate of dispersion whilst the rate of production is constant; and 3rd, Simply increase in the amount of blood sent to the skin—the only organ by which in health we are cognizant of temperature.

In reference to the 1st, we remark that no thermometric proof has been given that during the action of alcohols the temperature of the blood in the central parts of the body is increased. As to the 2nd, it has not been proved that the dispersion of heat is increased, as might be shown in the effect of the radiated heat upon surrounding substances as ice; but on the contrary, it is highly probable that the dispersion is diminished. The dispersion of heat takes place both by radiation and evaporation; by radiation as if it were merely inanimate matter, but by evaporation as a living organism; and it cools by the absorption of heat as the fluid becomes converted into vapour. The freer the perspiration or the evaporation the cooler the body becomes because vapour absorbs and renders latent 1,000 times more heat than was held by the volume of fluid from which it was derived. We have just shown that the skin is commonly dry and harsh during the action of alcohols, and as that is a state the opposite of that in which free evaporation or perspiration occurs, it follows that it is one in which there is lessened transpiration and consequently lessened removal of heat.

The third condition is one mainly dependent upon the force of the heart's action, by which the current of blood is driven to the surface; and there can be no doubt that in the hot stage of the action of alcohol, the heart's action is increased. This will give increased sensation of heat, by bringing more warm blood to the skin, and, at the same time, will increase the dispersion of heat in any climate in which the temperature of the surrounding air is less than that of the body.

Hence we conclude that, whilst there is a temporary increase in the sensation of heat during the early action of alcohol, there is no proof that there is an increased production of heat; but it is more than probable that there is diminished dispersion of heat and the result is therefore temporarily the same. Alcohol does not produce, but it saves heat. It is not transformed, and it is not a true food.

In this action all alcohols act alike, for it is due to the alcohol alone.

3. We have now to consider the third statement, viz., That alcohols lessen the waste of the system.

Now, assuming this to be so, do we well understand what it means? It is assumed, on the face of it, that by lessening the waste the system gains, and that the gain is an advantage. But health means a due balance between want and supply, and if you lessen the waste you should at the same time lessen the supply, or you will have the evils of excess; and if you lessen both the waste and the supply, it follows that you have lowered the vital actions below that amount which constitutes health. There must be a certain fixed amount of vital action to maintain life, and there is always a further variable quantity to enable us to fulfil the active duties of life. To save waste, therefore, in health and with due supply, is to induce disease. Now, as to the fact of there being diminished waste during the action of alcohols.

It has been affirmed, on the testimony of many observers, that alcohols lessen the amount of carbonic acid evolved; but if, as the same authorities state, the alcohol is consumed and converted into carbonic acid and water, why have we not an increased instead of a lessened evolution of carbonic acid? The two statements nullify each other. I have elsewhere pointed out the sources of error in these statements, and shown that they are due to inferring total amounts from mere percentages, as in Prout's experiments; from mixing up other influences with those of alcohols; from inferring large quantities, as those of a day, from observations occupying a minute; from the natural variations of vital action during the day not having been then known; and from believing that one kind of alcohol represents the whole series. To-night I have stated to you that some alcohols do lessen the amount of carbon expired whilst others increase it; but it will be observed that the effect, in either direction, is but small, and that alcohol, by its action upon the heart, apart from its own transformation, may in a small degree excite the vital actions and thereby slightly increase the excretions.

It is also affirmed that, under the action of alcohol, there is less nitrogen, or urea, evolved, and this seems to have been established by many experimentalists, among whom I would mention Hammond, and thence it is asserted that the muscular tissue of the body is saved. Now, I beg of you to understand that the connection of urea with muscular tissue is far less established now than it was years ago, and I have shown, by recent experiments at Coldbath-fields prison, that, in the absence of food, the labour of the tread-wheel (which is surely muscular action enough) does not increase the evolution of nitrogen, or urea. But however this may be, there is a connection between urea and food, and we cannot read Hammond's experiments without seeing the fallacy upon the face of them. He was living at a border fort of the United States Government, with a medium temperature of 73° in the shade, and ate from 16 to 22 ounces of flesh, 18 oz. of bread, 6 oz. of soup, 4 oz. of beets, 1 oz. of butter, &c., per day, and he records the following statement:—

"Whilst the experiments were progressing, the healthy action of my system was much disordered. Headache was constant; sleep was disturbed; the skin was hot; pulse full and bounding, averaging 98 per minute; and there was on two occasions, after eating, a slight palpitation of the heart. My appetite was capricious. Sometimes disgust was created by the mere sight of food; at other times I ate with a good deal of relish. I think I should have been seriously ill if I had continued the investigation longer."

Surely, here we have an abundant explanation of the diminished urea or nitrogen, which he discovered, not in that the alcohol lessened the waste of his tissues, but that it made him ill. The food which he took was not digested and transformed into tissue, but accumulated, and at length, after each experiment, induced a violent, but, as he says, salutary diarrhœa. In fact, whilst eating excess of food, and perhaps gaining weight, he was starving his system, and there would necessarily be a less amount of the products of transformation.

This, I have no doubt, is the explanation of all such experiments, but it will vary as the system is able to rid itself of its dangerous disturber. In our prison experiments we found that alcohol lowered the excretion of the nitrogen

at first, but on the third day the quantity regained its former level.

Hence, I consider it to be proved that if alcohols do lessen the waste of the system in health, they do it actual injury.

We have now cursorily considered the three statements proposed for discussion, and have shown:—

That the class of alcohols is a heterogenous one, both in its composition and action.

That alcohol is only one important element of the class.

That the aromas of wines and spirits have a decided action, and constitute an essential part of the value of those substances.

That the gluten and sugar of beers are valuable agents in promoting the assimilation of food; and in proportion as wines contain the same elements they have a similar action.

Hence, there are three actions due to alcohols (apart from any questions of their use as foods) viz., the general stimulating and disturbing one of alcohol, the conservative one of the aromas, and the digestive one of gluten and sugar.

Alcohol is not a true food, and it neither warms nor sustains the body by the elements of which it is composed.

It lessens the dispersion of heat by lessening the action of the skin, and it increases the action of the heart.

When it lessens the excretion of carbon or nitrogen, it does so by disturbing the assimilative process, and thus, instead of saving, it starves the system.

I will now bring this communication to a close, by categorically stating a few facts which arise out of the preceding discussion.

1. Alcohol, although it is not a food, is a medicine, since it varies the intensity of the processes of the system, without being itself transformed and converted to the purposes of the body.

This is a fundamental fact, and when it is well understood, it will not be found difficult to define the conditions in which alcohol is useful and not useful, and I will now name a few of them.

Thus, when the want and supply of the body are duly balanced, and in proper amount, as in the ordinary condition of health, it is not useful, but, by disturbing the balance of the vital actions, may be injurious.

When the vital wants are greater than the supply, or than the due transformation of the supply of food, the volatile aromas are useful.

When the whole vital processes are low, as in fatigue and debility, it is probable that alcohol may be useful.

When the powers of digestion and assimilation are dedeficient, it is probable that beer may be useful.

When, by exertion or cold, there is an ususual but temporary call upon the system, which cannot be responded to by suitable food, alcohol may be useful.

In hot climates, as India, when the system is enfeebled, when the skin is perspiring too profusely, and the powers of digestion and assimilation are deficient, it is probable that alcohols may be useful.

When, under the same conditions of temperature, there is not too profuse a perspiration, and the temperature of the external air is equal to, or higher than, that of the body, alcohols must be most dangerous.

Of two men living under the same external conditions, the one with a perspiring skin may take alcohols largely without danger, so long as the skin perspires, but the man who has habitually a dry skin must avoid them.

In cold climates, where the powers of transformation of food and the supply of food should be very great, the free or continued use of alcohol must be dangerous. This has been affirmed to be true by Dr. Rae, and is the experience of many northern navigators.

Lastly, In young persons, in whom the supply of food should be excessive, in order to maintain growth, the constant use of alcohol may be very dangerous, and prevent growth.

Such are a few of the medical requirements of alcohols, apart from actual disease.

2. Although alcohols are not foods, and cannot supply the place of foods, they cannot be dispensed with, but should be prescribed medicinally and as carefully as any other poisonous agent.

3. The English are so notorious for their love of medicine as to be designated a nation of quacks, but yet it is not sufficiently appreciated that, whilst they pay only some five or six millions a year to the whole medical profession, they spend sixty millions yearly in the purchase of this one drug.

4. The habit of wine drinking is in part due to the evil of late dining. In other experiments, I have shown that all the vital actions of the body decline in the evening, and hence, at that period, the appetite needs the stimulus of artificial food; and alcohols are then more requisite and exert less influence. If, as a nation, we would avoid the use of alcohols, we must distribute the food more largely in the early, and less plentifully in the later, parts of the day; for, at the former period, the system has greater necessity for it, can more quickly digest it, and has then a more simple taste for it. In doing this, we need not revert to the old-fashioned suppers, but with plenty of food taken early, tea and coffee will suffice for the later meals.

Alcohol drinking is one of a connected series of evil habits. To remove one, we should lessen all.

5. The manufacture of beers and their use in India, are national questions.

If the action of ales be as above given, of what value, we may ask, are the bitter beers of the day? It is true, that they have done well in supplanting the alcohol of the strong, old-fashioned ales, but they have not done well in having given strychnine or quassia water, for sugar and gluten. They are grateful, but they are comparatively useless, except as bitters, and induce a vast waste of money.

If ales be taken, not as alcoholic compounds, but as digestives, then the good, full-bodied malt and hop ales, now gone out of fashion, are required; and these would be more useful when drunk in quantities of wine or ale-glasses full, than in large volumes from our pewter pots and glass tumblers. Let those who would drink ales rationally, select the best quality, and drink them as they would drink rich and full-bodied wine, and such a course, if generally adopted, would be an effectual temperance movement.

The introduction of strong ales into an Indian climate, is opposed to all that nature teaches us, and whilst medicinally, (and therefore in numerous selected cases) they may be useful, as ordinary dietetics, or for any large body of men indiscriminately exposed to great heat, they must be most injurious. The only valid excuse for our conduct is that drinking ale is a less evil than drinking arrack.

In this matter we are in truth pandering to one of the failings of an Englishman—that of taking England with him into every climate; and I cannot but fear that this act of our government is as dangerous as it is scientifically indefensible.

Lastly, there is a wide-spread conviction, still existing amongst our working classes, that they cannot do without their beer, and so far as it is based upon truth it implies that this is necessary to the digestion of the starchy food with which so many are obliged to be content; but it is chiefly based upon the fallacy that the comfortable sensation which they experience after drinking is indicative that beers nourish them. In a large hospital experience, I am unable to convince the poor washerwoman, and even the man who has no resources, that 2d. spent in milk will do far greater service than when spent in ale or gin. No doubt it is easier to do without these stimulants when there is abundance and variety of food, warmth and pure air, all of which are still lacked by a very large proportion of our community, but when the working classes shall truly understand the exact value of alcohols, we need not doubt

that we shall soon find even the sober man better fed and housed. But habits of temperance and economy are high up in the social scale of duties, and the temperance movement amongst the poor and ill-fed will be successful in proportion as it is associated with all other efforts tending to the religious and social elevation of our race.

DISCUSSION.

The Chairman said, in calling upon the meeting to discuss this paper, he would recapitulate a few of the points which he thought it most important for them to bear in mind, as it would be impossible, in the limited time at their disposal, to enter into all the social and moral questions involved in the subject. It seemed to him that Dr. Smith's researches had been most valuable. He had in the first place shown them that, even from the time of the Flood, the instinctive observation of man had come very near to the truth, and that in the pre-scientific periods it was considered that there was a difference between one fermented liquor and another, between one stimulating drink and another. They would, doubtless, recollect how this idea was remarkably exemplified in the two inimitable pictures of Hogarth, "Beer-lane" and "Gin-alley;" the different effects of those two beverages upon the human frame being strikingly and truthfully pourtrayed. But when science took up the question it (unfortunately in his opinion) invented the plural word "alcohols." It would, perhaps, have been better to have adhered to the old terms of fermented liquors or spirituous drinks, as these were less likely to lead to confusion. Attention had been drawn to the remarkable difference between the effects of various wines, which was probably owing to the presence of different ethers, which no doubt varied much in their action on the human system. He thought Dr. Smith had made a slight error, when speaking of the experiments of M. Lallemand and his colleagues, in stating that aldehyde did not give the characteristic reaction with the test liquid, for their investigations had shown that aldehyde did not pass off during the experiment. The second point which Dr. Smith made was that alcohol was not a food, by which term he meant that which conduced to the actual growth of the body. He was probably right in stating that alcohol did not actually supply matter to the body, but at the same time it was a fair subject for discussion, whether it did not contribute to the growth of the body in another way, by enabling more food to be taken and the food itself to be better assimilated by the system. The anæsthetic action of alcohol was probably valuable; and its stimulating effect on the nerves of the stomach might enable it more easily to take up food which otherwise could not be received into the system. Sometimes a person went home tired with the daily worry of life; he could not at the time sit down to his dinner with an appetite, because his nervous system was prostrated by exertion; if he rested for four or five hours, no doubt his appetite would return, but in the meantime his body would have been wasting through abstinence from food. If, however, he took a glass of wine, he would probably then be able to take food with a good appetite, and to digest it, and by that means he would contribute to the growth of his body. With regard to the term "waste," he agreed with the author of the paper, that it was an improper one to be applied in the present case. That which was called waste might be more properly termed metamorphosis, by which the vital functions of life were carried on. Dr. Smith had spoken at some length of the researches of Dr. Hammond upon this subject, and he had recorded that in instances where an excess of food was taken, or even where a sufficient quantity of food was taken to keep up the weight of the body, alcohol was deleterious. But no mention was made of the further series of experiments by Dr. Hammond, in which he took a diminished quantity of food, and in those experiments not only was there no loss of health from the use of alcohol, but the weight of the body was maintained; whereas it was proved that when he took a diminished quantity of food without alcohol, the body lost weight, and he also lost health. He thus showed that one of the great uses of alcohol was the enabling a person who either did not take sufficient food, or had imperfect powers of digestion, to avoid waste of the system. Alcohol then came in beneficially, and he believed that was the case in the majority of instances with those who could only take small quantities of food. These he believed to be the medicinal uses of alcohol to temperate persons, and that was a subject which he thought would be amply sufficient to fill up the time of the meeting.

Dr. Lankester thought they were greatly indebted to Dr. Smith, for the persevering manner in which he had followed this question up; and whatever differences of opinion there might be, they could not but give him the highest credit for the manner in which he had carried out these experiments, for they were no light matter, involving, as they did, getting up early in the morning, and voluntarily resigning one's self to intoxication before breakfast; and he imagined it required some considerable powers of persuasion to induce one's friends to do the same thing for the sake of science. At the same time, he thought Dr. Smith must feel that his experiments had been directed almost exclusively to one particular effect of alcohol upon the system; and if he found any fault at all, it would be that perhaps Dr. Smith had been a little too hasty in the deductions he had made from the special effects of alcohol which he had studied. The respiratory function was only one amongst a number of others which must be more or less affected by the action of alcohol, but it would appear that the experiments of Dr. Smith had been entirely confined to this. They must remember that the action of alcohol was very considerable upon the skin, upon the secretions of the kidneys, and upon the mucus membrane of the stomach and intestines, and all these must be studied before they could fully arrive at correct conclusions with regard to the general action of alcohol upon the system. Having stated these facts very generally (and the chairman, as a physiologist, would feel them to be of some importance) he would draw attention to the fact that Dr. Smith had not gone into detail as to the number of experiments upon which these results had followed. It seemed to him important to know the number of experiments made. Then, again, it appeared that some of the experiments were repeated upon the same individual with different results. It seemed to him that the experiments were not sufficiently numerous and varied to admit of any conclusion being drawn with regard to the influence of alcohol on the respiratory functions, much less on the whole system. We might, therefore, be inclined to ask whether these results might not, in some measure, be due to individual peculiarities, and whether it was correct to regard them as the constant effects of alcohol upon the human system. He gathered that Dr. Smith's conclusion was that alcohol in some manner acted upon the blood so as to produce the varied effects that were observed upon taking rum, ale, or stout, as well as other forms of alcohol, which modified the quantity of carbonic gas expired. It did not appear to him that that was clearly made out, and before arriving at any definite conclusion as to the results of taking alcohol, in order to judge of its effect on the system, we must investigate the action of alcohol before it gets into the blood, and ask whether there were not other effects of alcohol which produced these variable results in the condition of the respiratory system. He would point to the fact that alcohol, taken into the mouth, acted differently upon the mucus membrane from beer and wine; and these, if carried from the mouth to the stomach, would produce different results. There would be a difference according to whether the alcohol was taken in the form of pure spirits upon an empty stomach, or with food, or in the form of wine or beer; in each case, the action upon the mucus membrane would be different, and in all these cases might eventually act differently upon the respiratory functions. Then, after the alcohol had been primarily

taken up from the mucus membrane, and carried into the blood, there seemed to him to be different effects produced by alcohol upon the nervous system independent of its effects upon the respiratory functions. Thus they found that alcohol in a pure condition acted differently upon the nervous system to what it did in the form of wine or beer, and produced a different series of effects; and they must remember that, as to the general result of habitually taking spirit or beer, in the first case the digestive functions were interfered with, whereas beer alone would produce an entirely different effect, and yet, according to Dr. Smith, the effect was the same on the respiratory functions. In this way the action of alcohol might be compared to that of salt. Thus it was found that a man might take small quantities of salt from day to day with his food with benefit, but he might take enough to act upon the nervous sytem and produce vomiting, or upon the mucus membrane, to produce diarrhœa. The effects of alcohol, therefore, must be estimated individually in order to judge of its general results upon the system. He thought they could not come to general conclusions from those limited experiments. Dr. Smith had dwelt very properly upon the theory introduced more particularly by Dr. Liebig and the school of physiological chemists which arose after his writings upon agriculture and organic chemistry. All who had read the works of Liebig and his successors of the same school, must feel that many hasty conclusions were arrived at. Liebig himself was an admirable chemist, and came to admirable conclusions as far as his facts went, but there was an absence of that deeper study of the influence of agents upon the human body which could alone command the assent of physiologists. An instance of this was furnished in the fact that Liebig hastily regarded alcohol as a heat-giving food, and Dr. Smith had done good service in not only showing that those who were opposed to Liebig in this theory were right, but also in demonstrating that the action of alcohol was not that of a food, in the sense of contributing materials to form the tissues of the body, or absolute fuel for supplying animal heat. But, at the same time, as the chairman had well observed, this word "food" was used popularly in so wide a sense as not to be suitable for scientific purposes. People could hardly be brought to regard bread and cheese as food, and ale or porter as medicine, and, therefore, the chairman had properly designated the latter as auxiliary food,—at the same time, they must allow to the public the use of this word "food." An interesting point then arose as to what was the influence of alcohol on the two great functions of food, that of flesh-forming and heat-giving. At first sight it would appear from these experiments as though alcohol diminished the heat of the body, because in certain cases the quantity of carbonic acid gas expired was taken as the measure of heat produced, and there seemed to be such a discrepancy between the action of rum and other descriptions of alcohol, that he was inclined to doubt whether the free carbonic acid gas thrown out in these cases could be taken as the measure of heat produced in the body. At any rate, even in the case of rum, they must not suppose that alcohol acted in itself as a fuel to the body, but rather as a poker acted upon a fire—stirring it up, and producing by that means an increased quantity of carbonic acid gas. Dr. Smith had, however, suggested that the alcohol of rum was not an agent of that character, but he had placed it within the class of those aromatic substances in wine which decreased the respiratory action. This was a discrepancy in his theory. Supposing they found that the carbonic acid gas manufactured in the system combined with some other constituent of the body and passed off in some other form, then he did not think the conclusion of Dr. Smith was right—that alcohol could not be regarded as an increaser of heat. Then there remained the other important question, viz., the influence of alcohol upon the muscle or flesh-forming portion of the body. How did it increase this? and did it, when the substance was deposited in the body, prevent its passing to decay too rapidly? It appeared to him that under certain circumstances, according to the results of Dr. Hammond's experiments, and those of Becker, Houghton, and others, it did act in some such way, either by direct action upon the primary process of digestion, or in the secondary process of assimilation, both of which had to do with the muscle-forming functions of the body, and that it did increase that power in certain cases. This was seen in the case of old people, in whose systems the tendency to waste was greater than that to form tissue; alcohol in such cases acted either in producing more tissues, or arresting the waste of such as were deposited in the system, and such persons, though not in a state of disease, were thus enabled to pursue the duties of life with more comfort by the use of alcohol. There could be no question as to the effects of some forms of alcohol in the production of adipose matter in the body, and they found that where large quantities of alcohol were habitually taken that effect was produced, and that where there was a predisposition to form fat, alcohol was a means of facilitating its production. These were questions which could not be set aside, when they looked at alcohol from that one point of view. The effects of alcohol generally were such as to impair the natural processes going on in the human frame; and that it was destructive to health and life, to a considerable extent, must be generally admitted, but that it could be successfully abolished from European society he did not believe, and he should have to reflect much before he could consent to such a course. The races of mankind most distinguished in intelligence, morality, and religion, had been those who had habitually taken certain quantities of alcohol, and he should hesitate before he took a step which might hazard the retrograding of a nation in its physical and vital condition.

Mr. Morson remarked that he should be sorry if this paper were the means of promulgating what he believed to be a popular error, in respect of strychnine being generally employed to impart the bitter taste to ale. He believed this was a perfect fallacy, and he would ask Dr. Smith on what authority, if upon any, he had made that statement. He would mention the fact, that on one occasion a French chemist applied to him to know how it was so much strychnine was consumed in England, as he entertained the popular notion that it was largely employed by our brewers in the place of hops. The fact was, that the large consumption of strychnine both in this country and in Australia, was attributable to its use for the destruction of vermin. He thought such a statement as had been made in the paper should not be allowed to go forth uncontradicted.

Dr. Herbert Davies said there was one point in the remarks of Dr. Smith which was exceedingly important to those who were engaged in hospital practice. In such a practice the cases of *delirium tremens* were very numerous, and the habits of persons so affected had been to live for weeks and months taking scarcely any food, and following the practice of Sir John Falstaff—a half-pennyworth of bread and several shillings worth of sack. It was, however, remarkable that in many cases there was no emaciation of the frame, and the wonder was that with so little solid food they could perform so much manual labour. He thought the *rationale* of the matter was this, that alcohol in certain forms of spirituous liquors, prevented the waste of the tissues already formed in the body; but whether it acted by direct assimilation or in keeping up the tissues once formed, it was difficult to decide. His own belief was, that the effect was to keep up the elements of the tissues, and to prevent them being carried off by the excreta, as would be the case in a normal state of health.

Mr. P. L. Simmonds said that the opinions advanced by Dr. Smith, with respect to the uses of alcohol in warm and cold climates were certainly opposed to the generally received opinions, for Dr. Smith appeared to consider that alcohols might be useful in certain conditions in warm climates, and injurious in other conditions in cold climates. It depended on the form in which they were administered.

In the arctic regions spirits were generally taken raw, while in the tropics, as far as his own experience went, when taken at all, they were usually taken in a very diluted form; indeed, the preference was given to light wines. The scientific experiments made with certain of the best known alcohols were highly interesting, and it would be more so if this investigation could be carried out as to the influence and effects of many others less generally known, although in extensive use. The fact was patent that almost every nation, savage or civilised, used some special fermented, vinous, or distilled beverage, indigenous or exotic; and the inference, then, would seem to be, that reason or instinct proved that they were, to a great extent, stimulating and invigorating. Taken in moderation, they would seem not only to promote digestion, but to supply carbon to the system, give energy to all the vital functions, relieve the lassitude of the nervous system, and call into action the intellectual powers. The sources of many of the native drinks were curious. The Japanese had their sácie; the Chinese their sam-shoo, from rice; the Pacific Islands their kava, from the root of the Macropiper (*Methisticum*); the Indians and Malays their palm toddy and arrack, from rice; the Tartars their koumis, from mare's milk; the Mexicans and Spanish Americans their pulque, from the agave, and their aguardiente; the South Americans their chica, from maize; the North Americans their Indian corn whiskey, peach brandy, and lager beer; the West Indians their rum; the Abyssinians their tallah or millet beer; the nations of Southern Europe their wines; the Russians and Poles their rika and wodka or potato whiskey; the Germans their beer; while beer, alcohol, and potato brandy, impregnated with a large amount of fusil oil, were now in very great use in several of the states of Europe. In the United Kingdom our liquors were more varied, embracing gin and whisky of home manufacture, to the extent of 24¼ million gallons, and about five million gallons of foreign spirits, exclusive of the imported wines and 477,000,000 gallons of beer drunk. Although in this, as in everything else, there were excesses and abuses, among certain classes, of a wholesome stimulant or medicine, to adopt Dr. Smith's phraseology, yet it was certainly not indicative of growing intemperance in the nation to find that the present consumption of alcoholic drinks, British made and foreign, was, even with the increase of population, only about the same as it was ten years ago. Such calm and scientific investigation of the subject in its physiological and chemical aspects, was far more calculated to do good than prejudiced harangues, from well-meaning but intemperate partisans, and compulsory legislation.

The Chairman directed attention to the extremely deleterious nature of fusil oil, and inquired whether any one present could state in what description of liquors it was principally to be found. He had himself formerly attempted to use it in lieu of ether, as less expensive, but in every case its poisonous qualities rendered it inapplicable.

Dr. Lankester replied that he believed its effects were largely experienced by the drinkers of new Irish whiskey.

Mr. Morson added his testimony to that of the Chairman, as to the deleterious nature of fusil-oil upon the human system.

Mr. Meredith expressed the gratification with which he had learned the fact that abstinence from spirituous liquors was gaining ground in all parts of the civilised world. It had been proved by experience, that in the coldest as well as in the hottest climates the hardest description of labour could be performed better without the use of alcoholic drinks than with them; and he was glad to find that abstinence was practised to a large extent by the working classes of this country. He was also gratified by the statement of Mr. Simmonds, that the consumption of spirituous liquors in this country had not shown any increase during the last few years. It proved that a great experiment was being made here, and he hoped the light of science would be applied, in order that the action of this substance on the system might be generally understood.

The Chairman then proposed a vote of thanks to Dr. Smith for a most valuable commencement of what he believed would be an invaluable series of researches, and for the interesting paper with which he had favoured them.

The vote of thanks having been passed,

Dr. Smith, in reply, noticed that whilst much had been said of a general and indefinite character by some of the speakers, there had been but few facts stated, and but little information given to which he could reply. He reminded the meeting that his experiments, and the facts that he had adduced, had shown that alcohol has one action, aromas another, and the gluten and sugar of beers a third action, and each must be applied to the special requirements of each person; also that as alcohol was not transformed, it could not be a food, and could only aid in nutrition by its power to sustain the action of the heart and circulation, and to lessen the waste of heat by the skin —actions which were medicinal, and the essential ones of alcohol. This was the explanation of their beneficial effects under the influence of cold, and in many persons with defective appetite and powers of assimilation, as had been referred to by the Chairman. He had demonstrated that evening, on several gentlemen, that alcohol passed off by the breath for some hours, and for the first time had proved that it passed off from the human skin, as had been shewn for four hours by Mr. Critchett, who had enclosed his arm in an india-rubber bag, and carried the products of the perspiration over the proper test. In France it had been shown to pass off from the skin of the dog, but it had not been before shown to proceed from the skin of man, and from so small a part of the body as the arm. In reference to the action of aldehyde upon the test, he believed that M. Lallemand had stated that aldehyde had no influence upon it. As to the determination of the amount of waste proceeding when alcohol had been taken by Hammond with insufficient diet, he remarked that weight was no absolute test of waste of tissue, since alcohol had been shown to prevent the excretion of water and fæces, which would increase the weight for a time. Hammond still took ten ounces of meat daily, when he was said to be losing weight, but as the total loss in five days was only three-quarters of a pound, when the imperfection of scales was recollected, and the difficulty of weighing a man accurately, also the variation in the amount of excretion remaining within the body, it was absurd to attach importance to so small a change. Alcohol rendered the weight stationary, and since it decreased the amount of urine and fæces evacuated, it was only surprising that it did not do more than this. With insufficient food the skin was very active and the heart was enfeebled, and therefore alcohol, by its essential actions, was likely to do temporary good. Hammond's experiments on carbonic acid were not valuable, since he inferred the total quantity of the day from three experiments of one minute's duration each, made observations after food had been taken, when the quantity was very variable, sought to inspire as in health, and, therefore, only to obtain per centage results, and used defective apparatus. He (Dr. Smith) believed that the results of these experiments were not satisfactory. He had shown in his paper the action of alcohols upon the respiration, the urea and the secretions, and did not know what more Dr. Lankester could desire. It was no evidence that his experiments on rum and other alcohols were not correct, because Dr. Lankester could not explain the results. The first step was to prove the action, and the second was to find the reasons for it. He had proved the first, and perhaps Dr. Lankester, instead of throwing doubts upon them in a general manner, would disprove them by experiment and satisfy himself as to the cause of the results. His (Dr. Smith's) results had been proved to accord with the observations of the Chairman in reference to Hogarth's delineations, and with universal practice. He did not know how to show such an action upon the nervous system as Dr. Lankester had referred to, since alcohol had been proved to enter the blood in less than

two minutes, and he had felt it in the brain in three minutes. The action upon the heart and brain was not through the general nervous system, but by direct contact. It had been found in the brain longer than in any other part of the body. His (Dr. Smith's) experiments had been made upon healthy persons, with moderate doses duly diluted, and under conditions the most favourable to truthful results, and although there would be differences in effect from differences of dose, they would be always in the same direction. The stronger the spirit the greater would be its local action. Alcohol certainly did not produce fat, but the other elements of beer did so. Fusil oil was found in all inferior spirits, and in the later hours of the distillation of alcohol. It was believed to affect the head, but he had been informed by an eminent man, that he had seen a person drink a glass of bad spirit with a relish, which he knew contained half the quantity of fusil oil. Strychnine was a powerful bitter, so that a drop of a solution of strychnine added to one pint of water made it very bitter, but not in the least poisonous. It had been erroneously supposed that, because strychnine was a poison, the use of it in manufacturing beers was injurious, but in the limited quantity in which it was used as a bitter, it was very useful medicinally, and was much used in homœopathy. He (Dr. Smith) had no new facts as to its employment, but he had referred to it, not as an injurious, but as a bitter agent, and it was clear that some bitter was used other than hops. Beers as mere bitters were totally different things from beers containing plenty of sugar and nitrogenous matter fitted to aid digestion. He was startled at the remark that Dr. Lankester associated the intelligence of nations with the habits of drinking alcohols. All nations, however degraded, had found out fermented drinks, and must therefore be distinguished for intelligence. In this country, those who drank alcohols freely, as the *habitués* of gin-palaces, were not remarkable for intelligence. He saw no such connection as that which had been asserted, and he would think that man the most intelligent, *cæteris paribus*, who abstained from the use of alcohols as a rule, if he were in good health, and took them as circumstances arose which called for their employment. Moreover, as the body had a marvellous power of self-correction and adaptation, we were all enabled to use many things within certain limits, which, although not necessary, did not become injurious. Alcohols might be taken as many persons took medicines, namely, as luxuries.

The paper was illustrated by a series of experiments, tending to show that alcohol passes off from the body unchanged, both by the breath and by the perspiration, for several hours after being taken into the system. Three gentlemen, the first having taken an ounce and a half of alcohol three hours, the second two hours, and the third half an hour previously, breathed for some minutes through the test liquid described in the paper, all producing the characteristic green colour, whilst others who had taken no alcohol for twenty-four hours, on breathing through the liquid, caused no change whatever. Another gentleman, who had taken a similar quantity of alcohol, had his arm enveloped in an air-tight bag, through which a current of air was passed into the test liquid; and this experiment being repeated several times during the evening, on separate portions of liquid, the characteristic reaction was shown at the expiration of the first, second, third, and fourth hours after the alcohol had been administered. This was the first occasion on which the last-mentioned experiments were performed.

The Secretary announced that on Wednesday evening next, the 23rd inst., a paper, by Mr. Leonard Wray, "On Tea and its Production in Various Countries," would be read.

INTERNATIONAL EXHIBITION OF 1862.

The *Building News* says:—"We rejoice to hear that Mr. Bell is preparing for the Exhibition of 1862, a statue of Cromwell, 10 feet high. From the preliminary half-sized statue, this promises to be finer than any of this gentleman's works of this kind—better even than the justly-admired Falkland, in the Houses of Parliament. The attitude is strikingly original and characteristic, and fully embodies the vigorous ruler of the commonwealth, of whom Macaulay so justly says:—'Such was his genius and resolution that he was able to overpower and crush everything that crossed his path, and to make himself more absolute master of his country, more dreaded and respected, than she had been during many generations under the rule of her more legitimate kings.'"

POLYTECHNIC INSTITUTION.—EDUCATIONAL DEPARTMENT.

In this department, which is under the direction of the Rev. Charles Mackenzie, there are both morning and evening classes, the former being designed principally for ladies, and for these the subjects are Arithmetic, German, Lithography, French, Drawing, Bible History, Greek, Latin, Bookkeeping, English Grammar, Chess, Elocution, Botany, Literature. In the evening classes, in addition to the subjects just enumerated, the following are taught:—Writing, Algebra, History, Common Things, Chemistry, Architecture, Practice of Commerce, Singing, Practical Geometry and Engineering, Physics, and the Principles of Engineering Construction.

Some of the classes are specially arranged for the University Middle Class Examinations, as well as for those of the Society of Arts.

With reference to instruction in Architecture and Building, the prospectus says:—

A growing desire for some opportunities of systematic instruction in Architecture and Building has latterly been evinced, and should architectural examinations, as now proposed, become established, such opportunities will become indispensable.

It is believed that short courses of instruction, bearing upon the practice and requirements of the present day, while they are not intended to take the place of an extended and comprehensive curriculum, will be found acceptable and useful to many young men engaged in pursuits connected with architecture, viz., the pupils or assistants of architects, engineers, and contractors, and those engaged in the superintendence of works, or the skilled departments of building, art-workmen, and art-students.

For this year (1861) three distinct but connected courses are proposed, each to extend through one quarter, concluding with an examination, and to be illustrated by diagrams.

The First Course, on the Essentials of Building;) or (1) Materials, and (2) Construction; the first to include stone, brick, timber, iron, glass, lead, zinc, cements, &c., with the ornamentation appropriate to each material; the second, foundations, masonry, brickwork, carpentry, joinery, &c.

The Second Course, on Architectural Character; or the history and practice of classic, mediæval, and modern styles of architecture, with notices of distinguished architects and their works.

The Third Course, on Modern Practice; or (1) Re-

quirements and (2) Methods of Working; the first to comprehend the special peculiarities of dwelling-houses, cottages, mansions, churches, schools, hospitals, theatres, &c., construction of buildings as to sound, heat, ventilation, and sanitary matters. The second referring to the duties devolving upon the architect, surveyor, &c.; also designs, competitions, plans, details, specifications, tenders, contracts, carrying out works, surveys, and the Building Act.

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS.

(*Continued from page* 112.)

BEET-ROOT SUGAR.—The cultivation of the beet-root for the manufacture of sugar has of late years received an immense development in the kingdom of Poland and in the adjoining provinces of Russia. The first factory was established in 1831, and the first refiners in 1839. The manufacture had increased to such an extent that in 1856 there were 52 factories in the kingdom; thirty-five were to be found in the government of Warsaw alone. The conversion of beet-root into sugar is entirely performed between the end of September and the commencement of April in each year, beyond which time the beet-root if kept becomes deteriorated. The total quantity of loaf sugar and sugar of a coarser character made in the season 1856-7 amounted to 29,013,000 lbs.

AT RIGA coined money cannot legally be exported from Russia, and the paper-money of the State cannot be brought in. It is taken away if discovered, and forfeited to the Crown when proved to be genuine.

VERMICELLI.—The manufacture of "paste" (or vermicelli, as it is called in England) continues to be one of the most flourishing trades in Genoa. There are about 100 manufacturers in Genoa itself, 20 in Sampierdarena and Nervi, and 14 in Savona. The export of paste in boxes in 1856 amounted to 11,238 quintals.

LEATHER.—At Leipzig leather becomes every year a more important branch of German industry. Above a million of hides are annually prepared for sole-leather alone within the Customs' Union, and the whole quantity of leather produced is estimated at 140,000,000 lbs. annually, of which tanned leather forms 80 per cent.

BARRELS made of Bosnian oak are said to discolour light wines, probably from the superabundance of gallic acid.

SALTED OLIVES are exported in large quantities from Brussa, in Turkey, chiefly to the Danube and Russian ports in the Black Sea. In 1858 considerable contracts were made for the delivery of the article on the coast at 12s. per cwt., and the produce of fresh olives for the same year was calculated at from 34,000,000 to 40,000,000 lbs., along the shore from Ghio and its adjacencies to near the Rhyndacus.

SILK is the richest production of the Austrian Empire, in which the total mean annual quantity of silk cocoons produced reaches 27½ millions of kilogrammes, about 60,630,000 lbs. avoirdupois, which, at Austrian livres, 430 give a value of 124 millions of Austrian livres, equal to about £4,230,000.

This production is divided as follows:—

	KILOGRAMS.	LBS.
Lombardy	15,000,000	33,075,000
Venice	10,200,000	22,491,000
Tyrol	1,568,000	3,457,440
Other Provinces	672,000	1,481,760
TOTAL	27,440,000	60,505,200

This statement is based on the reports of the several Chambers of Commerce, on the statistical annals of Milan, and on the observations of Giacini and Angelo Mazzold respecting the results of the year 1852, which is selected as a fair average; 1853 having been, generally, an abundant year, and 1854 and 1855, on the contrary, very scanty.

In the official reports of the year 1847, the production of cocoons in Lombardy was estimated at 19,624,500 lbs., and in the Veneto at 12,899,250 lbs. Assuming this to be a fair approximation, it results that, in five years, the production of cocoons throughout the Lombardo-Venetian Kingdom has increased 86 per cent.

The cocoons are converted into raw silk at the spinneries. The number of spinneries in Lombardy, in 1840, was 3,068, with 34,627 caldrons, besides smaller establishments with not more than one or two caldrons each. The number of caldrons now reaches 42,000, giving occupation to 95,000 persons during 50 days of the year.

Each caldron is calculated to produce 79⅓ lbs. of raw silk, hence the production amounts to 3,307,500 lbs., and the total quantity of cocoons spun in the Lombard spinning-mills must be reckoned, one year with another, at 41,895,000 lbs.; to make up which between 7 and 9 millions lbs. are imported from the Venetian provinces.

The 3,307,500 lbs. of Lombard raw silk (including 551,250 lbs. waste) give, at 2,945 Austrian livres, equal to about £1 the lb., a value of £3,333,000 sterling. The value of the cocoons is, therefore, increased by spinning, £428,000, two-thirds of which are consumed by the expenses of labour and fuel; hence, the net profit of the spinneries is equal to between £102,600, and £140,000 sterling.

In the territory of Venice the spinneries are numerous, but on a small scale, with the exception of a few in the Friulano, which receive cocoons from Gorizia and the sea-coast, and a certain number in the Veronese and Vicentino. These two last provinces contribute the larger portion of the cocoons sent to Lombardy and the Tyrol, owing to which exportation the number of their caldrons decreases annually.

The caldrons in the vicinity of Venice may be calculated at 20,000. They afford employment to 48,000 persons, and spin 16,537,500 lbs. of cocoons, producing 1,503,810 lbs. of silk, the greater part of which is coarse-spun, and may be valued at £1,500,000; whence it results that in the Venetian provinces the raw material acquires an increased value of £165,000, which, deducting expenses, gives the spinners a net profit of £45,000.

The Southern Tyrol, in 1855, possessed 184 large silk spinneries, besides smaller ones, with a total of 5,368 caldrons, employing 11,000 persons, and furnishing 348,390 lbs. of raw silk spun from 3,991,050 lbs. of cocoons. To make up the quantity of cocoons required beyond the production of the country, the Venetian provinces supplied about 550,000 lbs. The gross profits of the spinneries amounted to £20,500, and the value of the silk produced £2,291,350. The other provinces of the empire produce about 230,000 lbs.

The whole production, therefore, of raw silk in Austria amounts to 5,512,500 lbs., of the value of more than £5,250,000, and the number of persons employed in the spinneries is not less than 160,000.

The raw silk is subjected to a fresh process in the throwing-mills.

As the tables of Austrian Commerce for 1852 show that 770,000 lbs. were exported by way of Venice, Trieste, Switzerland, and the Italian States, whilst the importation only reached 228,150 lbs., it may be said that of the whole produce of the empire, as before stated, about 5,000,000 lbs. remain for home consumption; two-thirds of which are consumed in Lombardy.

In the province of Milan there are 93, and in the whole of Lombardy 525, throwing-mills, with 1,239,000 spindles; 700,000 for throwing, and the remainder for folding the silk, employing 12,000 persons, namely, 4,500 men,

5,500 women, and 2,000 girls, besides 30,000 bobbin-winders, who work also for the Venetian throwing-mills.

The total production amounts to 1,550,000 lbs. of tram, and 1,276,000 lbs. of organzine, or 2,826,000 lbs. of thrown silk, which at £1 3s. 9d. a lb. give a value of £3,355,870. To produce this quantity, 2,955,000 lbs. of raw silk are required, which calculated at £1 1s. 1d. a lb., amount to £3,100,000, whence it follows that an annual gross profit of about £320,000 is obtained by the throwing-mills in Lombardy.

The throwing-mills of the Venetian Provinces offer the same proportional results as the spinneries do; producing, however, a larger proportion of sewing-silk, of which Verona alone (though declined from its former importance in this respect), produces 265,000 lbs. annually.

About 1,320,000 lbs of raw silk are consumed in the Veneto, producing 1,255,000 lbs. of thrown silk, worth about £1.190,000, reckoning the waste, and employing 18,000 persons, including bobbin-winders working out of the establishments.

The gross profit of the throwsters is about £102,000. Their labours increasing the value of the raw material to that amount.

In the Tyrol there are now 57 throwing mills, with 104,903 spindles, besides numerous smaller works, collectively employing 2,100 persons, and producing 335,000 lbs. of thrown silk of the value of £280,000 for which 347,600 lbs. of raw silk, costing £242,000, are consumed. Including the worth of the waste silk, a gross profit is obtained of £38,000.

In Austria, the ulterior labour of manufacturing thrown silk into silk stuffs, takes place almost exclusively at Vienna, Milan, and Como; a considerable quantity is also wrought up with other material, particularly wool, in the manufacture of damasks, tapestry, &c.; but the greater part of the thrown silk is exported either in a grey state or dyed.

This branch of manufactures is rapidly increasing in the capital of the empire, which alone consumes half of the whole quantity produced, and including the dyeing establishments, employs a capital of £1,200,000. From 1839 to 1852, the consumption of thrown silk, for weavers' use, increased in Vienna from 542,300 lbs. to 1,188,000 lbs.

Milan is next to Vienna in the importance of its manufactures of silk stuffs. Its productions amount annually to more than 325,000. Como, engaged only in the manufacture of plain stuffs, has a greater number of looms than Milan, and produces to the amount of about £260,000.

There are silk manufactories in the Italian Tyrol at Ala and Roveretto, and many in the Venetian Provinces, as well as numerous looms at Venice, Vicenza, and Verona, for velvets and ordinary silks. The value of the manufactures thence produced is estimated at about £165,000.

The amount of the silk manufactures, comprising articles made of waste silk and knubs, and stuffs of mixed material, cannot, therefore, be estimated at less than £2,400,000.

Summing up all these particulars, and bearing in mind the increased value which waste silk acquires by manufacture, as also the silk itself, after being dyed, it follows that the cultivation and manufacture of silk in Austria give a general total of 6¼ millions sterling, and support fully 800,000 individuals during the whole or part of the year.

Glass and Glass Bead Manufactories.—The glass manufactories of Venice, formerly so renowned, have long since lost their pre-eminence. When the general commerce of the Levant and Mediterranean forsook the Venetians, their manufactures declined. Having obtained a high perfection in that of glass, they became heedless of further improvement, and France, England, and Bohemia were enabled to obtain a superiority of which they are not likely to be deprived. The Venetians, however, still excel in making glass beads, which form one of the most important articles of their export trade, the amount annually manufactured being estimated at about £200,000. The attention of the manufacturers is particularly directed to the production of enamels, and of a counterfeit gem called "Avventurina," and common glass vessels are still made to a great extent for exportation to Greece and the Levant.

Coal at Valdagna.—A mining company, established in Venice, in the year 1840, under the name of the "Società Montanistica," has successfully worked the coal-mines at Valdagna. In fourteen years these mines have furnished upwards of 150,000 tons of coal. As it serves every purpose (except for producing gas) in the manufactories and steam-mills, it has superseded English coal, which is now only used mixed in small proportions with the Valdagna.

Mining in the Province of Venice.—The neglect into which this industry has fallen may be attributed to the scarcity of firewood, caused by the destruction of the forests, to the want of practical and technical knowledge of mining, as well as to political and financial vicissitudes. A Company has lately been formed, called the "Lombardo-Venetian Company," for the carbonization of peat-turf, with a view to utilise the numerous pits of this fuel existing in the Province of Venice, and thus in some measure supply the deficiency of firewood.

Cotton Goods.—A manufactory of cotton goods, containing 250 looms, has lately been attached to the spinning establishment at Pordenone, the productions of which tend to lessen the consumption of British goods. In Lombardy, 18,000 looms are employed in the manufacture of cotton, of which 16,000 are in the province of Milan. The spinneries and manufactories are increasing in importance.

Cotton.—The great staple of the commerce of the Bight of Benin is now palm-oil; ivory is the next article in value exported, and cotton, which is now being extensively cultivated around Abeakuta, forms the third. The readiness with which the inhabitants of the large town of Abeakuta have extended their cultivation of the cotton-plant, merits the favourable notice of the manufacturer—of the philanthropist—and, as a means of supplanting the slave trade, by its turning the attention of the native to the value of the soil and of human labour—of her Majesty's Government. The same difficulty which attended the first cultivation in the United States some seventy years since, is now experienced by the Abeakutan cultivators—the want of machines to clean it, and separate the seed from the fibre; in consequence of this difficulty, but a very small proportion of the cotton cultivated around Abeakuta has as yet been prepared for shipment.

Tobacco and Aquadiente.—From Bahia, in the Brazils, are imported large quantities of roll tobacco and aquadiente, principally in vessels under the flags of Sardinia and Portugal, the flag of Brazil being now rarely or never seen on this coast. It is difficult to ascertain the exact quantities of these two commodities sold in the Bight of Benin, as the Sardinian and Portuguese vessels laden with them usually strike the coast at the most windward or western fort on the gold coast, and then proceed eastward as far as Lagos; but it has been estimated that at least 3,500 rolls of tobacco and 2,000 pipes of aquadiente were imported in 1856; the value of the the former being six dollars the roll, and of the latter seventy dollars the pipe. Roll tobacco was formerly, and still is, the principal medium of payment for slaves. A large quantity is carried into the interior, and the ivory now finding its way to the sea coast is mostly purchased with that article.

The Reef Rocks of Pernambuco.—The province of Pernambuco lies betwixt the 3rd and 11th degrees of south latitude, and the 32nd and 40th degree of west longitude, its extent of coast being upwards of 800 miles; its principal ports are Pernambuco, Paraiba, Maceio, Rio

Grande do Norte, Aracate and Ceara, and are all formed by that wonder of nature, the Recife, or reef of rocks, which not only traverses the whole coast of the Consulate, but extends itself for 1,500 miles from Maranham to the southward of Bahia. This reef is of such extreme geographical and commercial interest, that I shall commence this report with a description of it. In coming along the coast of Brazil, from the southward, it first appears near the small river Una, in the province of Bahia, a few miles south of the capital; thence it continues its unintercepted course for 1,500 miles to the capital of the province of Maranham; its average distance from the shore may be about half a mile, at some parts of the coast it runs on shore; at others, it is as much as seven miles out at sea, notwithstanding which exceptions, the regularity with which it follows every indentation of the shore is very remarkable; the nature of its geological formation has been much questioned; the generally received opinion is that it is the work of the Coralina; but this has been strongly denied by others, who declare it to be sandstone; I feel no doubt in my own mind that it belongs to the former system, for in those parts still beneath the surface of the water, I have myself gathered live white coral of the most picturesque description, and which may be obtained in any quantities; but when the reef rises to the surface, and the insects abandon their labour, nothing appears to me more reasonable than the conclusion that the interstices of their beautiful fabric become choked with sand and broken shells, which, in the lapse of time, are incorporated with it, and give it the appearance of a rough sandstone: when cut by the chisel, it has the appearance of conglomerate; however, whatever the formation may be, this wonderful work of nature is at once the protector of the land from the heavy swell of the broad Atlantic, and the creator of numberless harbours for the nurture and protection of the navigation of a commercial people.

Home Correspondence.

INTERNATIONAL EXHIBITION OF 1862.

Sir,—As the project for holding a great Industrial Exhibition in the year 1862 is likely to be carried into execution, it becomes all those who feel an interest in the movement to offer what assistance they can towards its successful accomplishment.

From the pages of the *Journal* it appears that some of our colonies have already taken up the matter, and have resolved to contribute collections that shall fully represent their industrial resources. The execution of this design would probably be assisted, and the resulting collections enhanced in interest and value, if suggestions derived from the Exhibitions of 1851 and 1855 were drawn up and communicated, through the *Journal*, to committees abroad.

It is with this view that I take the liberty to offer some remarks upon the pharmaceutical products, both raw and manufactured, which we may hope will figure in the collections of 1862, and upon their mode of exhibition and the information that should accompany them. If those interested in other subjects would, in like manner, draw up a few notes on points to which it is desirable to direct attention, I cannot but think that useful results would follow.

The remarks I have to offer will be best arranged under the respective heads of *Unmanufactured Drugs*, *Chemical* and *Pharmaceutical Products*, to which I will add a few observations on the *Manner of Exhibition* and *Catalogues*.

Unmanufactured Drugs.—Substances of this class are not very attractive objects to the general public, but they are often extremely interesting and instructive to the man of science, as well as to the manufacturer. In the London Exhibition of 1851 there was a considerable collection of such products, but a far finer at Paris in 1855. Specimens of raw drugs sent from foreign countries should be carefully packed, so that they may arrive in good condition; the great enemy to be guarded against being humidity, which occasions specimens to become mouldy. If sent from abroad, arrangements should be made for examining them upon their reaching London, for rejecting any that have become spoiled, and placing such as are in a state for exhibition in suitable jars or cases. Every parcel should be labelled in the fullest and clearest manner, and each series of specimens should be accompanied by a list, giving fuller particulars than can be stated on a wrapper. In the case of a drug that is but little known, it is desirable to have the native name, and the scientific name also, whenever the latter can be given upon undoubtedly good authority. As a general rule, the economic product is the only part of a plant which it is needful to exhibit, but there are cases in which it would be extremely desirable to procure such specimens as would illustrate the origin of such product, the method of obtaining it, &c. Thus, *Balsam of Tolu*, a production of New Granada, would be vastly more interesting if accompanied by pressed and dried specimens of the tree (now almost unknown) from which it is derived; and the same remark applies to Sarsaparilla, to Myrrh, to Gamboge, to Olibanum, and to numerous other drugs.

In the Paris Exhibition of 1855, there was a large collection of drugs from India, but unfortunately it was very ill-arranged. Many products, in fact, were never made accessible for exhibition at all, and could only be examined upon leave being obtained to open the bags containing them. Some specimens were placed in *stoneware* bottles, so that inspection was out of the question; while a vast number from Ceylon and from Java, Sumatra, and other islands of the Indian Archipelago, were destitute of intelligible labels, and wholly unarranged. It was also remarkable that the pharmaceutical raw products of some important countries were entirely unrepresented; and that while there were admirable collections from French colonies, such as Pondicherry and Bourbon, and from some of our own colonies, as Jamaica and Demerara, almost nothing was contributed by Brazil, our settlements in China, our possessions on the West Coast of Africa, the Island of Trinidad, &c.

Chemical and Pharmaceutical Products.—This is a class of articles the exhibition of which draws forth a far more competitive spirit than the last; and, considering the progress that manufacturing chemistry has made during the last few years, and the liberal character of our import duties, there cannot fail to be an ample display of contributions, both British and foreign. The experience of former Exhibitions does not suggest many remarks regarding this class of substances. I may, however, mention that enormous specimens of crystallised salts, such as the ferrocyanide of potassium, sulphate of copper, &c., shown in Paris in 1855, are less indicative of the goodness of the articles than of the expense and trouble of conveying them from the manufactory to the place of exhibition. Hydrochloric or sulphuric acids, in glass jars containing *gallons* (such as I saw in Paris in 1855), are also quite as efficiently represented by smaller samples. The excessive absurdity of an entire case filled with dozens of bottles of cod-liver oil, of one and the same sort, all properly sealed and labelled, and apparently ready for sale, need not be insisted on, and we may well wonder that such a display should be admitted. Specimens, again, which are exhibited chiefly from their beauty of appearance, and which are evidence of no special skill on the part of the manufacturer, should bring little credit to the exhibitor. Of how much greater scientific value was the series of Dr. Frankland's organic radicals in the Paris Exhibition, than the heaps of brilliant, iridescent bismuth that so plentifully decorated the cases of many of the French chemical manufacturers.

Manner of Exhibition.—Under this head I would say a few words regarding the bottles and other recepta-

cles in which specimens should be placed. In the Paris Exhibition there were vessels of honour and vessels of dishonour,—stone bottles, utterly impervious to light, and vases so elaborately cut and gilt that their contents were hardly more perceptible. Of course such extremes should be avoided; moreover, bottles should not (except where essential for the preservation of the specimens) be hermetically closed, but should be fitted with such covers that the contents can be readily examined by those authorized to do so. Every specimen should be most clearly and legibly labelled; but even in this we may have an excess. I have seen a nice series of jars from one of our colonies, the contents of which were almost completely hidden by the amplitude of the paper labels pasted round the glass. Labels, indeed, should give their information briefly, fuller details being reserved for catalogues, of which I will now speak.

Catalogues.—These are very desirable for all considerable collections of raw materials. In the exhibitions of 1851 and 1855 there were several catalogues of particular departments, which could be had by those who felt interested to apply for them, though some, printed abroad, were difficult to obtain. The colonies of Algeria and British Guiana published very good catalogues, which may still be usefully referred to for information regarding the products of those countries in 1855. On the other hand, the products of Guatemala, New Granada, and Paraguay (and to some extent those of Mexico) were greatly shorn of interest from the impossibility of obtaining the information which well drawn-up lists would easily have afforded.

Apologizing for the length to which these remarks have extended.—I am, &c.,

DANIEL HANBURY.

Plough-court, Lombard-street, January 14, 1861.

MODERN HOSE.

Sir,—Dr. Wyld is exceedingly irate upon the use of shoddy, and repeats the arguments which have been frequently urged against the reconversion of substances for sale. But there are always two sides to a question; and while I have neither interest in the manufacture nor any desire to see waste materials used if the original raw material can be obtained in quantity to supply the demand, and at a price to meet the means of the masses, it is but fair that a few observations should be submitted in reply. The Divine command given on the question of food is, I think, equally applicable in the matter of clothing—that we should gather up the fragments that nothing be lost. This has been urged upon us of late strongly in the public journals, where we have been solicited to hunt out old worn and cast-off clothing for the use of the poor. A worn garment, a cheap pilot cloth, a railway rug, a thin blanket, are better than none at all. These are not, after all, such "diabolical shams" as the manufacture of only superior broad cloths at a price out of the range of millions to obtain. I presume I am the person pointed at by Dr. Wyld, as having cast a scandal on the Society in a paper which I read before the members. Now the paper was certainly not one "On Shoddy," for this was only incidentally alluded to among many other materials. My object was to inculcate thrift, a husbanding of resources, a utilization of waste products, and to show how skill and science, by reconversion, had turned to use many formerly neglected substances.

I do not remember that any of the members present "considered shoddy rather a good joke," whatever some of the minor articles, the collection and use of which I named, might have been deemed. Different eyes look upon the same subjects from a different point of view. No doubt everyone would desire to have the best article that is made; but this is not always possible, and cheapness is a failing with a very large class of purchasers, who thus complain of the inferiority of goods, expecting, forsooth, that the best fabrics are to be had for a low price. I am not an advocate or a supporter of adulterations of any kind, and, in the various publications with which I am connected, few have exposed more strongly those which militate against the health and due sustenance of the body. But, in this question of cheap woollen clothing, with the continued advance and scarcity of the raw material, it becomes a question of whether the poor shall have any woollen garments or none. I do not believe it touches the middle or upper classes of society. No respectable tailor, who is paid a good price for an over-coat or suit, would, I am sure, supply an inferior article. The poorer, or working classes, must, on the contrary, depend upon slop-made articles, for the main reason that the price comes within their means. But they are, for the most part, very good judges of fibres and material, and know full well what they are buying. The garments answer their purpose, even though they may be a mixture of half new and half old material, and the cloth sold at a price of 1s., 2s., 3s., or more a-yard, is within their means when that at 8s. or 10s. would not be.

It should be borne in mind that with the progress of population there is an increased demand for wool at home and abroad, and sheep husbandry scarcely keeps pace with the demand. The consumption of mutton is greater in Australia and the United Kingdom than it has been. The pecuniary means of the great bulk of the population are better than they were some years ago, and hence they are better customers for animal food and for clothing than they were. There is a greater dearth of labour in the pastoral districts of the colonies, owing to the attractions of mining, town labour, and mechanical operations. There is also a greater demand for wool in the United States and on the Continent. All these and other causes tend to restrict our supply of wool. The unusually severe weather, too, experienced during the winter and spring of 1860, caused a great falling off in the production of home-grown fleeces, and consequently led to an increased inquiry for all foreign wools that could in any way be adapted as substitutes, and as this deficiency in a very important item of our supply is likely to be again experienced in the coming season, it becomes a serious question how the demand is to be met, supposing consumption to progress at the present rate. A trade circular of one of the principal wool brokers thus speaks of the position of the wool market in the past year:—"There was an increase in the imports of wool, according to the official trade returns, of 10 per cent., from which must be deducted an increase in the exports of wool of 9 per cent., thus leaving a surplus of one per cent. only. Against this, however, there appears an increase in the exports of manufactured woollen goods and yarns of 8 per cent., which, added to the deficiency in the home growth of 15 per cent. last year, leaves the supply of wool 22 per cent. short of that of 1859."

The commercial treaty with France is calculated to give an additional stimulus to the exports of woollen fabrics, and to develop more particularly the resources of the carpet and worsted trades, and there will be a fresh outlet in China for English woollens; so that while there is at present a positive scarcity of most current descriptions of wool, there is a great fear of a further deficiency in sufficient supplies of the raw material. Dear coals and dear food are bad enough, and dear warm clothing will aggravate the evil. Anything, therefore, that can come to aid the supply for the masses, that will furnish warm garments, even though they be not so bright-looking, so fine, or so durable as might suit the taste and purse of our metropolitan physicians, will certainly be most acceptable to thousands, will come in to supplement our supplies of new wool, and give employment in the manufacture to a few thousand persons.

An addition of 5,000,000 or 6,000,000 lbs. of raw material, even though it be not of the first class, is no slight gain in a manufacturing or utilitarian point of view.

I have thus far dealt with the question of cloth, and I would now say a few words about stockings. I do not

think that the worsted of stockings is re-converted to the same use, however much it may be spun into yarn for cloth. The "garter" question I will pass by as irrelevant to the discussion. I very much doubt that Dr. Wyld's praiseworthy efforts to re-introduce hand-knitted stockings will be crowned with that measure of success, in a commercial point of view, which he anticipates. Machinery has made such inroads upon hand-labour in every department—knitting, weaving, spinning, or sewing—that competition with the power-loom seems almost futile, and successful competition as to price could not be carried on. It is even questionable whether the "good-fitting, good-wearing stocking" would, after all, find equal favour with the "rotten scarlet, purple, and other woollen hose," which Dr. Wyld deprecates. So dominant and capricious is fashion that the ladies will follow the lead, even "at the expense of the purses and tempers of fathers and mothers." As Mr. Thomas Dunn well states, "good stockings are to be had by paying a proper price for them."

In conclusion, may not the chemical action of some of the newly-invented dyes, on the worsted, have much to do with the rottenness alluded to?

Apologising for trespassing at such length,

I am, &c.,

P. L. SIMMONDS.

8, Winchester-street, S.W., Jan. 14.

COPYING PICTURES IN PICTURE GALLERIES.

Sir,—I had hoped that my last letter would have obviated the necessity of again trespassing on your space, but "S. R.," in his reply, persists in some of his mistakes. I will, after a few words of explanation, close my share of the correspondence.

Passing by the personal matter with which S. R. opens and concludes his letter, and coinciding with him that there must be some public capital laid out in the galleries for many things besides coals (a fact I never disputed), I come to paragraphs marked 2nd, 3rd, and 5th, (misprinted for 4th) and repeat that I adhere to my statements, which were made entirely from personal experience, and not from report of friends.

Regarding German art, if "S. R." will inquire among his artistic friends, they may perhaps induce him to retract his sweeping censure on the artists of Munich and Dresden. His instance of the arts in Italy suffering from the copyist needs no refutation—the cause of universal depression there being but too apparent.

But how about France and England, which he ingeniously forgets to mention, and where the "pernicious facilities," as he terms them, have so long existed? If his argument is good for anything, "modern art," in both countries, "exists only in the most degraded—most debased form."

If, as I willingly credit, "S. R." and others are agitating this question from a real desire to serve art, I would earnestly urge them to inquire more fully into the subject before committing the Society of Arts to a step which I firmly believe to be injurious to the cause which their position pledges them to support. I can confidently affirm that I have not made one statement that is not easily capable of proof, and must leave to others to say whether those of "S. R." are refuted or not. As no new arguments have been brought forward, I conclude that the case is stated, and shall, therefore, not trouble you more on the subject, but trust that the good sense of Parliament will reject the application unless grounded on better reasons than I have yet seen urged.

I am, &c., F. W. R.

Proceedings of Institutions.

Ryde Literary and Scientific Institute.—The annual general meeting was held on the 17th December. From the Committee's report it appeared that the receipts for the past year amounted to £168 7s. 11d.; the expenditure to £154 8s. 5d.; leaving a balance in hand of £13 19s. 6d. The number of pupils was stated to be 193. The Chairman congratulated the members on the prosperous state of the Institution.

Worcestershire Union of Educational Institutes.—The *Stroud Journal* says:—The meeting of delegates from the various Literary and Mechanics' Institutes of the Stroud district, to confer with a deputation from the above Union, was held at the subscription rooms, on Thursday, the 3rd January. Seven of the Institutes of the neighbourhood sent representatives, and after hearing the statement of James Tree, Esq., of Worcester, the deputation, three societies at once proposed to join the Union, the others only waiting the formal instructions of their committees before doing so. The advantages to Institutes connecting themselves with this association appear in brief to be,—that while each individual society in Union retains its full independence of action, they have collectively the advantage of an admirably arranged schedule of prizes annually given by the Union; a continual infusion of new matter into their libraries, by means of boxes of books purchased by the Union, and which pass from one society to another; assistance in the engagement of professional lecturers and the use of a large list of gratuitous lectures; the services of an experienced organising master for the formation and development of classes; and the mutual exchange of privileges amongst the whole of the members of societies in Union. There appears to be no doubt that the influence of this association will result in this county in a similar increase of efficiency in the affiliated societies, to that which, as shewn by the annual comparative report and tables, has followed its operations in Worcestershire. A hope was expressed that in case its operations are extended to this county, adequate subscriptions will be forthcoming from the friends of education, to enable it to cover as efficiently the larger sphere projected as it has hitherto done the one from which it derives its present name.

To Correspondents.

Erratum.—In last No. of *Journal*, p. 110, col. 1, line 31, for "progressive," read "aggressive."

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Brit. Architects, 8.
Medical, 8½. Mr. Henry Smith, "On the nature and treatment of the more severe forms of Stricture of the Urethra, especially when incision has been previously resorted to."

Tues. ...Royal Inst., 3. Prof. Owen, "On Fishes."
Civil Engineers, 8. Mr. Fred. Braithwaite, "On the Rise and Fall of the River Wandle."
Medical and Chirurg., 8½.
Zoological, 9.

Wed. ...Roy. Soc. Literature, 4½.
Society of Arts, 8. Mr. Leonard Wray, "On Tea and its Production in various Countries."
Geological, 8. 1. Mr. J. D. Smithe, "On the Gravel and Boulders of the Punjab." 2. Mr. W. Whitaker, "On the 'Chalk-rock,' between the Lower and Upper Chalk, of Wilts, Berks, Oxon, &c." 3. Prof. Huxley, "On *Pteraspis Dunensis* (*Palæoteuthis Dunensis*, Roemer)."
Archæological Assoc., 8½.

Thurs...Royal Inst., 3. Prof. Tyndall, "On Electricity."
Philosophical Club, 6.
Numismatic, 7.
Philological, 8.
Royal, 8½.
Antiquaries, 8½.

Fri. ......Royal Inst., 8. Dr. G. C. Wallich, "On the Nature of the Deep sea Bed, and Presence of Animal Life at vast depths in the Ocean."

Sat. .....Royal Inst., 3. Dr. E. Frankland, "On Inorganic Chemistry."
Royal Botanic, 3¾.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, January 11th*, 1861.]

Dated 5th December, 1860.

2982. C. W. Siemens, 3, Great George-street, Westminster—Imp. in fluid meters.

Dated 13th December, 1860.

3060. G. F. Chantrell, Liverpool—An improved draught generator. (A com.)

Dated 14th December, 1860.

3076. J. P. Baragwanath, 22, Castle street, Falcon-square—Imp. in hydraulic punching apparatus. (A com.)

Dated 17th December, 1860.

3094. J. Morison, Paisley—Imp. in apparatus for spinning or twisting.
3098. A. Eddington, Springfield, Chelmsford—Imp. in draining ploughs.
3102. E. L. Morel, Paris—Imp. in ships' rudders, and the mode of mounting or applying the same to the stern-posts of vessels.

Dated 18th December, 1860.

3106. T. L. Preston and T. Lloyd, Birmingham—Imp. in the manufacture of metallic bedsteads, chairs, and couches, and other articles of like manufacture.
3110. C. L. Hancock, Pentonville—An improved fuel.
3112. J. Chesterman, Sheffield—Imp. in door and gate springs hinges, and centres, the improved springs being applicable to other purposes for which springs are employed.

Dated 19th December, 1860.

3114. W. Spence, 50, Chancery-lane—Imp. in apparatus for closing doors and keeping them closed. (A com.)
3116. R. J. Cole and M. Scarvell, Pembridge-gardens, Bayswater—Imp. in ornamenting or illuminating glass for decorative purposes.
3118. J. Brinkley, Carrickfergus, Antrim, Ireland—Imp. in furnaces for consuming or preventing the emission of smoke.
3120. R. A. Brooman, 166, Fleet-street—An imp. in irons for ironing. (A com.)
3122. J. Gilmore, Ramsgate—An improved method of raising water in baths.

Dated 20th December, 1860.

3124. W. Mossman, 1, Cleveland-terrace, Downham-road, Islington—The manufacture of bonnets from papered cloth.
3126. J. West, Kingstown, near Dublin—Imp. in apparatus for drying grain. (A com.)
3130. F. Schwann, Gresham-street—Imp. in dressing and stiffening fabrics and yarns, and in preparing and cementing the stiffening materials used.
3132. G. B. Rennie, Holland-street, Blackfriars—Imp. in machinery, apparatus and works of construction, intended to be employed, and the mode or method of using or employing the same for the purpose of examining or repairing ships and other vessels.
3134. E. Southam, Manchester—Imp. in machinery and apparatus for retarding and stopping railway trains.

Dated 21st December, 1860.

3138. J. Chatterton, Highbury-terrace, and W. Smith, Pownall-road, Dalston—Imp. in the manufacture of electric telegraph cables.
3140. J. Rigby, Suffolk street, Dublin, and J. Needham, Piccadilly, Middlesex—Imp. in breech-loading fire-arms and cartridges.
3142. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in magneto electric machines. (A com.)

Dated 22nd December, 1860.

3146. E. Cook and J. Stokes, Birmingham—Imp. in sacking and joints for bedsteads.
3148. G. Sandys, Aldersgate-street—A novel instrument or apparatus for conveying signals or communicating intelligence, between railway stations and other distant points.
3150. W. Clark, 53, Chancery-lane—Imp. in the manufacture of colouring matters. (A com.)
3152. A. V. Newton, 66, Chancery-lane—Imp. in watches. (A com.)

Dated 28th December, 1860.

3177. G. H. Birkbeck, 34, Southampton-buildings, Chancery-lane—Imp. in furnaces for consuming smoke. (A com.)
3179. C. Binks, Parliament-street, Westminster—Imp. in manufacturing certain gases applicable in generating heat and light, and in bleaching.
3181. C. Pallu, Nogent-sur-Marne, near Paris—Imp. in the apparatuses and process for producing photographic pictures without working in dark rooms.
3183. A. V. Newton, 66, Chancery-lane—An imp. in breech-loading fire-arms. (A com.)

Dated 29th December, 1860.

3187. E. R. Burnham, Liverpool—Imp. in apparatus or machinery for stamping, shaping, or forming certain kinds of goods, manufactured of india rubber, gutta percha, and like substances.
3189. H. W. Viner, Penzance—Imp. in grand pianofortes.
3191. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in printing calicoes and other fabrics. (A com.)

INVENTION WITH COMPLETE SPECIFICATION FILED.

28. P. Courtais and F. Jammet, Port Vendres, France—Manufacturing of paper and pasteboard waterman.—5th January, 1861.

PATENTS SEALED.

[*From Gazette, January 11th*, 1861.]

January 11th.	
1666. W. K. Hall.	1727. L. Unger.
1675. S. Povah.	1728. F. C. Seyde.
1679. J. Askew.	1730. A. C. Bamlett.
1680. T. Brearley.	1735. D. Skekel.
1682. H. Shaw.	1737. P. V. du Trembley and A. D. Martin.
1683. F. Ayckbourn.	1748. J. H. Johnson.
1688. J. W. Edge.	1749. I. N. Davis.
1694. A. Strathern, A. Strathern, jun., and A. Strathern.	1758. J. Dickinson.
1695. C. G. Hill.	1816. A. Gélis.
1696. W. Allen and W. Allen.	1883. W. E. Newton.
1703. J. and S. Lingford.	1900. G. Jeffries.
1710. L. Hope.	1945. R. Smith.
1721. J. Thiebaut.	2084. J. Wilson.
1725. J. Henson & W. F. Henson.	2219. E. Scheithauer.
	2480. L. H. Rousseau.

[*From Gazette, January 15th*, 1861.]

January 15th.	
1712. F. L. H. Danchell.	1840. J. Ireland.
1726. J. Fletcher.	1890. W. Taylor, J. Pendlebury, T. Baily, and R. Harrell.
1742. R. A. Brooman.	1990. R. Smith.
1743. J. Hunt.	2124. H. Moore.
1750. A. B. Woodcock.	2166. J. Hamilton, jun.
1754. J. Saxby.	2326. J. Haworth.
1763. E. Hollis.	2676. C. Harratt.
1770. W. Turner & J. W. Gibson.	

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, January 11th*, 1861.]

January 7th.	*January 9th.*
37. T. Greenwood and J. Batley.	42. J. A. M. Chaufour.
	78. C. A. de Laire de la Brosse.

[*From Gazette, January 8th*, 1861.]

January 12th.

63. J. Stenson.	114. W. Clark.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, January 11th*, 1861.]

January 7th.	*January 9th.*
70. M. Vetillart.	56. Rev. W. R. Bowditch.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Registry.	Date of Registration.	Title.	Proprietors' Name.	Address.
4316	Dec. 14, 1860.	Drawers or Pantaloons	Henry Cutler	6, Conduit-street, W.
4317	,, 15, ,,	Ellis's Cramp Preventer and Invalid's Fender	Samuel Ellis	22, Summer-street, North, Dublin.
4318	,, 18, ,,	Slide Buckle for Braces	W. Blenkiron and Son	123, Wood-street, Cheapside, E.C.
4319	,, 20, ,,	Fire Guard	R. W. Winfield and Son	Birmingham.
4320	,, 20, ,,	A Design for both Scarf and Tie (The Garibaldi)	James Mellor	7, Chestergate, Macclesfield.
4321	,, 22, ,,	The Pillow Cap for Travellers	Walter Jessop	4, Royal-crescent, Cheltenham.
4322	,, 29, ,,	An Indestructible Snap Cap	Wm. Harnett Blanch	29, Gracechurch-street, E.C.
4323	Jan. 4, 1861.	A Portable Gun and Cartridge Case for a Breech-Loading Gun	Robert Bryant	13, Gt. Queen-street, Lincoln's-inn, W.C.
4324	,, 8, ,,	The Registered Ladies' Drawers	Sharp, Perrin and Co.	10, Old Change, E.C.
4325	,, 10, ,,	Canteen	Frederick Cox	Brick-kiln-street, Wolverhampton.
4326	,, 11, ,,	False Shirt Front	Welch, Margetson, and Co.	16 and 17, Cheapside, E.C.

Journal of the Society of Arts.

FRIDAY, JANUARY 25, 1861.

EXAMINATIONS.—LOCAL BOARDS.

Those Secretaries of Institutions who have not already forwarded Lists of their Local Educational Boards are requested to do so as soon as possible, not omitting to specify the Chairman and Secretary.

Copies of the Programme of Examinations for the present year may be obtained by members of any of these Boards on application to the Secretary of the Society of Arts. In this will be found full instructions for their guidance in making the necessary arrangements for co-operating with the Society of Arts.

GUARANTEE FUND FOR THE EXHIBITION OF 1862.

It will be remembered that the late Mr. Matthew Uzielli was the first gentleman who came forward as a Guarantor for the Exhibition of 1862, having promised his name for £10,000, but his death before the execution of the Guarantee Deed left no liability on his estate. The Council, however, have much pleasure in announcing that Mrs. Uzielli has, in the most liberal manner, intimated her intention of guaranteeing to the amount of £5,000, and Mr. Theodosius Uzielli has, with similar liberality, promised his own name for £3,000.

The following additions and alterations have been made since the last announcement in the *Journal* for January 11 :—

NAME.	Amount.	Representing the Objects of the Society—Arts, Manufactures, and Commerce.
Amount last announced	£372,000	
Less by the death of Mr. Matthew Uzielli	10,000	
	£362,000	
Mrs. Uzielli, Hanover Lodge, Regent's-park, N.W.	5,000	Arts.
Theodosius Uzielli, 114, Piccadilly, W.	3,000	Arts.
*R. J. Mackintosh, M.A., 2, Hyde-park-terrace, Kensington-gate, S.W. ...	100	Arts.
Total	£370,100	

By Order, P. LE NEVE FOSTER, *Secretary.*

INTERNATIONAL EXHIBITION OF 1862.

The following letter has been addressed, by direction of the Senate of the Ionian Islands, to the President of the Ionian Association, promising the support of the Government to an Industrial Exhibition which is to be held at Corfu. In the programme of this Exhibition it is stated, that the articles which obtain the principal prizes will be forwarded gratuitously to England, in order to their being placed in the International Exhibition of 1862 :—

Senate Office, Corfu, 3rd January, 1861.

Sir,—The Senate, in furtherance of their desire to afford every support to the noble efforts of the Ionian Association directed to the development of Ionian industry and its advancement to perfection in its several branches, consent with pleasure to your request respecting the appointment of Commissions invested with authority in each island, for the purpose of co-operating in the preparation and organisation of the Exhibition announced by the Society to be held in 1862.

The Senate therefore nominate a Central Commission in Corfu, composed of the Regent, the Secretary to his Excellency the Lord High Commissioner, the Municipal Officer superintending Agriculture and National Industry, Col. Wynne, R.E., Sig. Antonio Polilà, Dr. Napoleone Zambelli, Sig. Allessandro Grollo, Sig. Nicolò Ventura, and Sig. Spiridione Marcoran. The Regent will be the President of the said Commission, and the Secretary to the Lord High Commissioner the Vice President.

The Central Commission will appoint their own Secretary.

In each of the other islands there will be a Local Commission, composed also of the respective regents, and the municipal officer superintending agriculture and national industry ; and his Excellency's concurrence will be solicited in appointing the residents to the Presidency of these Commissions, and in giving them instructions to that effect.

The Local Commissions may increase the number of their members by aggregating persons whose respectability, resources, and love of progress and national industry entitle them to consideration, provided the total number of members in each Commission do not exceed nine.

The object of the Central and the Local Commissions will be, to give a suitable impulse to persons or societies engaged in the different branches of Industry contemplated for the Exhibition, to prepare and complete the productions or the works of Art to be displayed on that occasion, and to afford such persons or societies every necessary facility and assistance in the preparation and conveyance of the several articles to Corfu, as well as in the transfer

of persons interested, recommending to Government all those necessary measures which could not be taken without its decisions and its intervention.

The Local Commissions, with regard to all purposes connected with their Warrant, will correspond with the Central Commission, which must be informed of all their proceedings and their gradual success; and the Central Commission will have the right of giving the Local Commissions such opportune instructions as may be occasionally required.

The Central Commission will communicate directly with the Council of the Ionian Association, either for the purpose of ascertaining their opinion when necessary, or of reporting the progress of the several Commissions for the information of the whole Society.

The Senate entertains a well-founded hope that the Commissions established will evince their patriotic zeal in promoting an object so highly important as the encouragement and the progress of National Industry, and that the honourable exertions of the Ionian Association will be crowned with success.

Having thus replied to the letter with which you honoured me on the 18th December, 1860, I hasten to inform you that the Senate came to these decisions on the recommendation also of his Excellency the Lord High Commissioner.

I have the honour to be, &c.,

A. L. DUSMANI.

Secretary of the Senate for the General Department.

Antonio Polila, Esq.,
President of the Ionian Islands, &c., &c., &c., Corfu.

THE SOCIETY'S EXAMINATIONS.—GOVERNMENT APPOINTMENTS.

At the recent examination by the Civil Service Commissioners, the following candidates, all of whom had distinguished themselves at the Society of Arts' Examinations, were successful in obtaining appointments :—

Mr. Henry Simpson, Messrs. Chance's Library and Reading-room, Birmingham.
Mr. Archibald S. L. Macdonald, Glasgow Mechanics' Institution.
Mr. Jos. Marshall Carpenter, Sussex Hall Evening Classes.
Mr. William Vaughan, " "

The first two were nominated to this competition by the Council of the Society, Lord Granville having kindly placed nominations at their disposal. Five appointments were given on this occasion.

ARTISTIC COPYRIGHT.

A meeting of the Committee took place at the Society's rooms, on Thursday, the 17th instant. Sir Charles L. Eastlake, P.R.A., in the Chair.

Sir Thomas Phillips, Chairman of the Council, reported to the meeting that a Deputation from this Committee, consisting of Sir C. L. Eastlake, Sir E. Landseer, R.A., Messrs. Mulready, R.A., E. Field, Wm. Hawes, A. W. Redgrave, and himself, accompanied by the Secretary, had had an interview with the Attorney-General, to whom the objects of this Committee were explained. The Attorney-General had expressed his willingness to assist the Committee in settling the Bill and to take charge of it in the House of Commons, and promised to urge upon Lord Palmerston the propriety of its being introduced into Parliament as a Government measure.

A resolution was thereupon passed, conveying the thanks of the Committee to the Attorney-General, for the attention he had given to the Bill, and for his promise to aid in promoting its success in the House of Commons.

Sub-committees were appointed to confer with the Attorney-General in settling the terms of the Bill, and for taking such measures as may be deemed necessary for forwarding the views of the Committttee.

On Tuesday, the 22nd inst., a deputation from this Committee had an interview with Sir George C. Lewis, at the Home-office. The deputation consisted of Sir Charles L. Eastlake, P.R.A., Sir E. Landseer, R.A., Sir Thomas Phillips, Messrs. Mulready, R.A., G. T. Doo, R.A., E. Field, Wm. Hawes, A. W. Redgrave, (Hon. Sec. of the Committee), J. M. Dodd, and the Secretary of the Society of Arts.

SEVENTH ORDINARY MEETING.

Wednesday, January 23, 1861.

The Seventh Ordinary Meeting of the One Hundred and Seventh Session, was held on Wednesday, the 23rd inst., J. Griffith Frith, Esq., Member of the Council, in the chair.

The following gentlemen were proposed for election as members of the Society :—

Brown, John	Rose-hill, Chesterfield.
Burzorjee, Dr............	Northwick-lodge, St. John's-wood-road, N.W.
Crockford, Joshua	212, Euston-road, N.W.
Irvine, Robert	Black Hurlet, near Glasgow.
Scott, Sir Francis E., Bart.	Great Barr Hall, near Birmingham.
Tennant, Thomas M...	Newington Works, Edinburgh.
Walter, William Thos.	19, Long-acre, W.C.
Wilkinson, John	St. Helen's Mills, Leeds.
Wilson, George, jun....	West Hurlet, near Glasgow.

The following candidates were balloted for and duly elected members of the Society :—

Bertram, George.........	Sciennes-street, Edinburgh.
Bucknall, William Miles	Board of Trade, Whitehall, S.W.
Budgett, John P.	Henleaze-park, Westbury-on-Trym.
Chambers, Charles......	Broomhall-park, Sheffield.
Goldschmidt, Otto	Argyle Lodge, Wimbledon-common, S.W.
Hands, Medwin	4, White-street, Coventry.
King, John Huffam ...	66, Hatton-garden, E.C.
Knott, William	Bentcliffe, Saddleworth, near Manchester.
Leahy, Francis	Shanakiel House, Cork.
Lorsont, Jean Baptiste Athanase	56, Cannon-street west, E.C.
Moody William	6, King's Bench-walk, Temple, E.C.
Pakington, J. Slaney ...	Kent's-green, Worcester.
Richardson, Samuel......	Doncaster-street, Sheffield.

Robinson, George	Water-street Dock-yard, Cork.
Thompson, M. W.	Park-gate, Guiseley, Leeds.
Veitch, James, jun.........	Exotic Nursery, King's-road, Chelsea, S.W.
Wood, George	Bradford.

Previously to the reading of the paper, the Secretary called attention to Mr. Holland's arrangement for fastening Miners' Safety Lamps, of which a description will be found at page 151.

The Paper read was—

TEA, AND ITS PRODUCTION IN VARIOUS COUNTRIES.

By Leonard Wray.

When we consider the quantity of tea consumed in the British dominions, and the money value which that quantity represents, we must be struck with the great commercial importance this article has attained. Yet I believe it is universally admitted, that of late years, as the supply has gone on increasing, so as the quality continued to fall off; until we can at present put but small faith in the purity of nine-tenths of the tea sold in this country.

Our millions demand an ever increasing quantity of cheap tea; and accordingly an article is made up and sold to them, at an apparently low price. But what do the buyers actually obtain for their money? It is the semblance of tea, but not the reality,—a veritable delusion and imposture.

The adulteration of tea is on so monstrous a scale, and the result is so eminently injurious to the health of our people, that it becomes an absolute duty to the public, not only that these fraudulent practices should be thoroughly understood, but that vigorous measures should be instituted with a view to remedy this great and crying evil. We want a very abundant supply of good and wholesome tea:—so cheap that the poorest may buy it, and so good that, having bought it, a beverage can be made from it, which they can partake of with comfort and advantage to themselves and families. This is really a consideration which should awaken the liveliest interest in every household throughout the length and breadth of the land,—for all are more or less affected by it. Such, then, being the case, I have the greater confidence in bespeaking your attention to the several points which I am about to offer for your consideration.

We are indebted, as you know, to the Chinese for our knowledge of this interesting plant and its uses; but how long that ancient people themselves have employed its leaves in making a beverage, no one can now, by any possibility, determine. Some Chinese authorities assert that its virtues were first made known during the reign of their Emperor Shin Nong, or 3,254 years B.C.—but the great antiquity this date would confer, has been, I think may say, carped at, rather than disputed, by European writers, who seem to find a singular gratification in decrying the historical and traditional records of the Chinese. I think that there is no improbability whatever in the Chinese account; indeed, I am quite prepared to believe that they might have known its utility and largely used it, for a very long, long time, before it obtained any place in their written or traditionary records.

The employment of the leaves, berries, and roots of plants may be considered to be one of the very first resorts of mankind, to appease those pangs of hunger which often press so heavily upon poor humanity, when existing in its most primitive state. Hence we find that those barbarous savages, who are existing in the most primitive condition, possess a seemingly instinctive knowledge of the alimentary value of the herbs whereby they are surrounded, and to which they are so frequently compelled to have recourse in order to sustain their very lives. But let us institute one comparison, viz., as to the probable priority in point of time, in the usage of tea and in the usage of wheat by mankind,—the former a wild plant, the latter a cultivated grain. Who will venture to say how many thousands of years B.C. this grain was cultivated and made into bread or cakes by man?

Historians allow an antiquity of 2123 years B.C. to the great pyramid of Gizah, in Egypt, and we may ask what was the condition of China in those days? Was she not as far advanced in the arts and sciences as Egypt? At any rate she claims for herself, and apparently with good reason, an antiquity much greater than Egypt. Bread was made, and contributed to the support of the Egyptians and other people no doubt many thousands of years before the pyramid of Gizah was built. Why is it improbable, then, that so simple a matter as the infusion of dried tea leaves, should have been known and practised by the Chinese at an equally remote period? A very great many arguments might be added to these, were it either necessary or desirable to do so, but I will not waste the time before us. It will suffice for us to know that the tea plant has been cultivated, and its leaves have been used by the Chinese, from a very remote time; and we can easily understand that the present very peculiar methods of manipulating the leaves, in order to obtain different kinds of tea, were not arrived at all at once, but were the result of long-continued practice and experience.

Some European writers have, with singular perversity, questioned the fact of the tea plant being indigenous to the soil of China Proper, and have asserted that it came originally from the Corea, in Mantchoo Tartary; but these assertions have been convincingly disproved by the comparatively recent discovery (by English botanists and travellers) of the true tea plant growing wild in the forests and jungles of Upper Assam, the Sylhet hills, and in other localities within the British territory in the Himalaya. In fact, the mountain range, nearly from the great river Yang-tse-keang to the south-western frontier of China, may be considered to be but a continuation of the Himalayan mountains, and along the greater part of this immense distance the plant has been discovered growing wild. Moreover, the Chinese accounts all agree that the tea tree was first discovered where it is found growing at the present day—namely, among the hills and mountains in the central provinces of the empire. In many of the Chinese provinces it is still existing in a wild state in great profusion, and Landers speaks of it as forming a "tea forest" on a mountain range near Zemmie, the capital of the Shan country; whilst it also grows wild throughout the jungle-covered mountains of Upper Burmah.

Ball says, "It appears that the tea tree is not only indigenous in China, but that it is cultivated throughout the empire, in the northern climate of Pe-chy-ly, and in the southern one of Quong-tong. * * * * * * * * It also grows in Japan, Corea, the Lee-kieu Islands, Chusan, Tonkin, and in Cochin China."

It is scarcely wise, therefore, to contest with the Chinese either in respect to the fact of its being indigenous to their country, or as to the antiquity of its use in that empire.

The Tea Plant and its Varieties.

The tea plant is of the genus *Thea* (Kaempfer), belonging to the order *Ternstrœmiaceæ*, and is so nearly allied to the genus *Camellia*, that no small disputation took place some years ago as to whether they were not absolutely of one genus, instead of forming two separate genera, as Linnæus asserted. Without employing time in such a discussion as this, however, we may remark, *en passant*, that botanists themselves have had a difficulty in distinguishing between, and identifying, plants of the *Thea* and of the *Camellia* genus.

It is now generally allowed that there are three recognised varieties of the tea plant, although there has been many a battle amongst botanists as to whether these are not three distinct species, instead of being merely varieties of one and the same species.

That very sad fellow Darwin had not, at that time,

shocked the susceptibilities of the faithful, with his profound theories on the "Origin of Species;" but there was even then a man—a bold and clever botanist, named J. W. Masters—who roundly maintained (in the pages of the "Agri-Horticultural Society of India's Journal") that these so-called species were, in reality, only varieties of the same species.

The plants disputed about are known as the *Thea Bohea*, *Thea Viridis* (Sinensis), and the *Thea Viridis* (Assamica); the two former being natives of China, and the

FIG. I.

Thea Viridis (*Assamica*).

latter of Assam. In a very elaborate comparison of the specific characters of the *Thea Viridis* of China, and the *Thea Assamica*, Mr. Masters endeavours to prove that they are identical, or very nearly so; and he also says:—"The only difference existing between the Assam plant and the China *Bohea* plant, is found in the texture of the leaf. The Assam leaf is long, thin, membranous, often undulated; whilst the China leaf is short, thick, coriaceous, and generally straight. And although, in the general appearance and habit of the two plants, there is a marked difference, yet the seeds which were sent from China as those of the true tea have produced plants differing more from each other than the generality of them do from the Assam plant."

Dr. W. Jameson, Superintendent of the Botanical Gardens, North Western Provinces, in a very able report to the Indian Government, dated 30th July, 1847, says:— "In the plantations (those of Kumaon and Gurhwal) there are two species (varieties?), and two well-marked varieties. The first species (Fig. 1) is characterised by the leaves being of a pale-green colour, thin, almost membranous, broad lanceolate, sinatures or edge irregular and reversed, length from three to six inches. The stem of newly-formed shoots is of a pale reddish colour, and green towards the end. The plant is also marked by its strong growth, its erect stem, and the shoots being gene-

FIG. II.

Thea Bohea.

rally upright and stiff. The flowers are but small, and it seeds but sparingly. In its characters this plant (received from Assam) agrees in part with those assigned by Dr. Lettsom and Sir W. Hooker to the *Thea Viridis* of China, but differs in its branches being stiff and erect. * * * By the Chinese manufacturers it is considered an inferior plant for tea-making, and is not, therefore, grown (here) to any extent."

"The second species (variety ?) see Fig. 2, is characterised by its leaves being much smaller, and not so broadly lanceolate; slightly waved, of a dark green colour; thick and coriaceous; sinature or edge irregular; length

from one to three and a half inches. In its growth it is much smaller than the former, and throws out numerous spreading branches, and seldom presents its marked leading stem. This species agrees well with the characters assigned to the *Thea Bohea;* it was brought from Amoy, in China, by Dr. Gordon, and it forms nearly the whole of the plantations in Kumaon and Gurhwal.

"In the plantations there is a third plant, which, however, can only be considered a marked variety of *Thea Bohea.* Its leaves are thick, coriaceous, and of a dark green colour, but invariably very small, and not exceeding two inches in length, and thinly lanceolate; the serratures too on the edge, which are straight, are not so deep. In other characters they are identical. This marked variety was received from Calcutta at the plantation in a separate dispatch from the others." (See Fig. 3.)

Mr. Robert Fortune, who so carefully explored the tea districts of China, distinctly says, that the *Thea Viridis* is universally cultivated in the northern provinces of China; that it is a much more hardy, free growing, and abundant producer than the *Thea Bohea,* which is confined to the more southern provinces. But there can be no doubt that both varieties abound in the central and southern provinces, although individual cultivators, and even whole districts of cultivators may, and assuredly do, pride themselves upon the purity and excellence of the particular variety they cultivate.

We must not, however, for one moment, take so erroneous and unnatural a view of this question as to suppose that there are not an immense number of varieties of the tea plant growing both in China and in every other country where it has long been cultivated; nor need we bind ourselves to the argument in favour of there being more than one species*, for we have so many instances in the vegetable kingdom of the wonderfully different forms into which varieties of one species will run, that we know from these every-day experiences how easily those variations may be reconciled. Look at the infinite number of varieties into which the apple and pear have run; or just take a glance at all our cultivated plants, and you will readily understand that in presenting itself under several different forms, the tea plant is only behaving as all other plants do. It is well known that some tea plants will produce seed vessels or pods, containing one, or at most two seeds; others containing two, or at most four seeds, whilst on other plants the pods contain from three to seven seeds. There is, however, nothing so very remarkable in all this. When we consider the changes brought about by the influences of climate, soil, season, and of peculiar modes of culture, combined with the natural tendency of all plants, I think we cannot come to any other conclusion than that arrived at by Mr. Masters, in summing up his observations on the Assam tea plant, viz., that they are all mere varieties of the same species.

The following are his very striking remarks:—

"Finally, having carefully examined living specimens, I have come to the conclusion that the Assam tea plant is identical with *Thea viridis* (as described in "Rees's Cyclopœdia"); and that the China tea plant, now growing in Assam, and supposed to be the true *Thea bohea,* differs from the Assam plant only in size and texture of leaves, the time of its flowering, the number of its flowers, and the abundance of its fruit. These differences, even trifling as they are, are not constant, for the China plant, when left to itself, approaches to the habit of the Assam plant; and the Assam plant under cultivation, and subject to the loss of its leaves, assimilates to the Chinese plant, both in size and texture of its leaves, and also in its multiflorous habit."

DISCOVERY OF THE TEA PLANT IN BRITISH INDIA.

I have already alluded to the Assam tea plant; but let us for a moment direct our attention to the magnificent prospects opened up to India, by the discovery of this most valuable plant being indigenous within her borders.

About the year 1824, Major Bruce and his brother, Mr. C. A. Bruce, were stationed in Upper Assam, and, finding the tea tree growing wild, made the fact known to Mr. David Scott, a very active, intelligent, and scientfic official, who very soon brought it under the notice of the late Dr. N. Wallich, then Superintendent of the Botanic Gardens at Calcutta. Again, in 1826, we find Mr. Scott sending seeds and leaves of this indigenous tea to Dr. Wallich; and once more, in 1827, 26th July, from Gowahatty, he writes him a highly-characteristic letter, from which the following is an extract:—

"I have the pleasure to forward, by this day's dâk (post), a small box, containing seeds, said to be those of the tea plant, and which have lately been received from a chief residing on the borders of Yunan.* About a year ago, I had the pleasure of addressing you on the subject of the Assam tea plant, and, at the same time, forwarded some seeds preserved for inspection. You will probably have met with the same plant in Ava territory, where, I understand, it is in great abundance, and known by the name of *Lip-p'hip-pin.*"

Now, I would particularly beg your attention to the three highly significant and important facts comprised in this brief extract. First, we have tea seeds brought from the borders of the Chinese province of Yunan, perhaps from that province itself, showing that some not very difficult road or pass from Assam into Yunan must exist, and be traversed by the native mountain tribes.† Secondly, we have a distinct and positive assurance respecting the Assam tea plant itself; and, thirdly, the tea forests of Burmah are alluded to as a circumstance well-known, and about which there could be no dispute, for he gives the very name by which the Burmese designate this indigenous tea. Let us not forget that this letter bears date July, 1827, upwards of 33 years ago.

It is, however, worthy of all remark, that Dr. Wallich, in 1823, called the attention of this estimable gentleman (Mr. D. Scott) to the value of tea culture in India, by sending him China plants, which, dying on their passage from Calcutta to Assam, were succeeded by a second despatch of Chinese seedlings, in 1824, the year in which Mr. Bruce discovered the indigenous tea of Assam. It is, of course, well-known to many members now present, that the Society of Arts very justly conferred on Mr. Bruce its gold medal, as the reward of this important discovery.‡

It is proverbial that all really great discoveries are a long time overlooked and neglected, and this instance certainly formed no exception to the rule, for some eight years after Bruce's discovery, and Mr. David Scott's labours, we find another very excellent and intelligent officer, named Captain Charlton, making strenuous efforts to revive the subject, and awaken an interest in this truly important national matter.§

It was some years after even Captain Charlton's attempts to create an interest in the indigenous tea of Assam that any systematic endeavour was made to grow and manufacture it in that country, but as I shall have occasion to refer to this endeavour again very shortly, I will say no more on the subject at this moment.

* I must express the very great respect I entertain for the opinions, however hastily formed, of such eminent botanists as Dr. Abel, Sir W. Hooker, Mr. G. Loddiges, Dr. Royle. and Dr. Falconer, but at the same time, as their opinions on this point are quite opposed to my own humble judgment and convictions I cannot honestly do otherwise than express my difference of opinion.

* A frontier province of China.

† The distance from Assam to Yunan is one month's march, or less, and indigenous tea is growing wild along the whole route.

‡ See "Transactions of the Society of Arts," vol. 53, p. 37.

§ The eminent services of Captain Jenkins, in the same direction, were rewarded by the Agri-Horticultural Society of India's Gold Medal.

I believe it to be an established fact that the celebrated Sir Joseph Banks was the first to recommend the experiment of growing the Chinese tea plant on the lower ranges of the Himalaya mountains; after him, Dr. Govan; and again, in 1827, the late Dr. Forbes Royle advised the same thing in a report which he sent in to the Indian Government.

In 1832, nothing having been done in the matter by the East India Company, the late Dr. N. Wallich addressed a memorial to the Committee of the House of

FIG. III.

Thea Bohea (Variety).

Commons, earnestly recommending the cultivation of tea in the districts of Kumaon, Gurhwal, and Sirmore.

I have already mentioned that the China tea plant was, in 1823, sent by Dr. N. Wallich to Assam, from the Calcutta Botanic Gardens, and I have little doubt that he also sent it about the same time to the several points nearest to the Himalaya range. Did we not know that those were the days of stage coaches and road-waggons in England, we might well wonder, that with an abundance of tea plants in the Calcutta Botanic Gardens, not even half an acre of experimental ground was ventured upon in the lower range of the Himalayas until the year 1836, or thirteen years after Dr. Wallich had sent plants to Mr. David Scott, in Assam. You will be able to form some faint idea

of the way they did things in those days, when I state that of 20,000 seedling plants sent by boat up the Ganges to the Himalaya station, 18,000 died by the way, and not 2,000 reached their destination alive.

Tea trees* have since that time been discovered growing wild near Sylhet, at Jynteah, in the Cossiah hills, in the Sikkim hills, and in various other localities in India.

Cultivation of the Tea Plant.

From what has already been said, you can readily understand that the tea is a very accommodating plant, both as respects climatic range and the nature of the soil in which it is planted. We find it growing, from Pekin, which frequently has winters of Russian severity,—to Canton and Macao, where the sugar-cane and pine-apple find sufficient heat to render them sure and profitable crops. The plant seems quite capable of withstanding winters of very intense frost, provided the summers are of sufficient duration and heat to mature perfectly the newly-formed wood which it makes. Any country therefore having a long and hot summer and a cold winter can grow tea. In England the summers are too short and too cold to effect a thorough ripening of the young wood,—hence the plant cannot stand our winters, mild as they are? Hearing that some were thriving vigorously in the open grounds of the Royal Botanic gardens at Kew, I wrote to Sir W. Hooker, asking him for facts, and in reply he informed me that the tea shrubs in the open air at Kew were planted in a border under a southern wall, but even in this sheltered situation were covered up every winter, or they would be killed. But, excluding our own and similar countries, we shall have no difficulty in finding any quantity of land in every way suitable to the constitution of the plant.

As regards soils, it may be accepted as a fact, that any kind of good or medium character will answer for tea-planting; whilst it will unquestionably grow, and produce small quantities of tea, upon very poor, gravelly or sandy soils, such as few other plants could exist in at all. But although this is undoubtedly the case, yet no one must run away with the notion that it is wise, or by any means profitable, to plant tea upon very poor land,—for this shrub likes, and requires, a good, warm, generous, and moderately moist soil, as well as any other member of the vegetable kingdom; and in such a soil it yields the largest amount of good and highly-flavoured tea. A very rich or highly-manured soil is by no means desirable, inasmuch as the plant would be over-luxuriant, and yield large, coarse leaves, full of rank juices, and curing into a harsh, ill-flavoured tea. I might occupy an hour in describing the soils upon which it is principally grown in China, Japan, Java, India, and the Brazils, but there would accrue no corresponding benefit from such a wearisome detail. It is quite sufficient for me to say, that any good, or moderately good land, will suit the plant, always understanding that the Chinese varieties† cannot abide any stagnant water about their roots; hence flat, low-lying lands, very retentive of moisture, should be entirely avoided; nor will these varieties thrive well under a system of excessive irrigation, for they require only that amount of moisture in the soil necessary to their healthy development. Flat table-lands, slopes, and hill sides, which have a good natural drainage, are consequently the situation chosen for this culture; indeed, in China, tea is often planted on hill sides so steep, that the "pickers" have to be assisted by fixed ropes or chains. On the other hand, any land that is subject to be dried and parched up in the summer should be rejected, unless the plants could be continually sustained in full vigour by some cheap system of irrigation.

Tea seeds will not without great care keep good for any length of time after they are gathered, therefore, they should, if possible, be sown at once, either in a seed-bed, or in the position the plants are desired to occupy in the field. In the former case, I think the best and safest plan is to sow the seed in pots set in the bed, so that, in transplanting them out into the fields, their tap-root may not be injured, for that would be fatal to them. The seedlings would also not receive that check in transplanting, nor would that operation occasion one-half the trouble and expense attendant on the seed-bed and digging-up system. But, undoubtedly, the best plan of all is to sow the seeds in the field at once, in order that the seedlings, once making roots, shall be subject to no change or check. There is seemingly a loss by this system, but, in reality, there is an actual gain, fully equal to one year in time, besides a great economy in doing away with the tedious and delicate operation of transplanting.

In very good soil, the plants are kept six feet apart, but according to the quality of the land, so will these distances vary, until, in very poor ground, we find them only three feet apart. Rows five feet apart, the plants being four feet along the rows, is a very good medium distance, each plant having 20 feet to itself, and there being 2,178 plants to the acre. Whether seedlings or seeds be planted, it is a good plan (although not necessary) to form a small bed, at least 12 inches square and 18 inches deep, at every point destined to receive the seedlings or seeds, for, by this means, the young plants attain a very vigorous growth in their early life, and thereby become larger and stronger, and better able to withstand the vicissitudes of the seasons.

When properly planted, the tea plant will continue to yield its leaves for a long period of time, varying, according to the quality of the soil, from 25 to 50 years, after which the stems may be cut down, the roots dug up, and re-planted in a fresh piece of land.

In Mr. Ball's excellent work* on the "Cultivation and Manufacture of Tea," is given, the Spanish Missionary Carpina's account of this very singular and interesting practice of the Chinese cultivators, in the part of the province where he resided, at Fogan, about 240 miles south-east of the Bohea country; and it is so curious that I cannot omit it. He says:—"With respect to the duration of the plants, in places which are suitable to them, and where animals cannot destroy them, they will last fifty years or more. When they are too old, if the soil is rich, they are cut down close to the roots, which is done at the winter solstice, and in the following spring they shoot out vigorously. But when the soil is sterile, the old roots are dug up, to be planted elsewhere. They easily take root again. It is in this manner that the shrubs are preserved and reproduced, and never by branches that are slipped off. They are also propagated by seed, but with less success, and much slower. The cultivators of tea take no pains to prevent the growth of the shrubs, for the larger they are, the more profitable; but as, in the second or third year after they have been planted or cut down, the leaves are gathered once, and afterwards three times a year, their growth is thereby checked. Yet in the plains and on the mountains, where the ground is good, they grow to a height of more than thirteen feet."

Father Carpina also mentions the fact of the Chinese cutting down the tea bushes growing wild in the mountains, and digging up the roots to transplant into their fields, as the readiest and speediest means of getting up a plantation of good, vigorous plants, which will yield the second or third year afterwards. The full value of this practice is the better understood when we compare it with the usual mode of forming a plantation, *i.e.*, by sowing the seed, which I will now speak of.

The land being properly marked out, three, four, or even seven seeds, are placed in each hole or bed, at a depth of three to four inches, and lightly covered over, the spot being indicated by a stick being stuck into the ground. Those that germinate are suffered to remain,

* The tea plant grows into a fine large tree, upwards of 50 feet high.

† The Assam variety is by no means so sensitive in this respect.

* Everyone interested in this subject should possess this book.

as they are almost always thinned out by insects or other casualties; but if not, the cultivator frequently allows them to remain to form a thick bush, although this is not always the case. The young plants are carefully tended until they attain a considerable size and a vigorous growth, when John Chinaman calls upon them to furnish him with leaves, taking, however, but one light picking as a commencement, and increasing the quantity taken season after season, as the plants become older, stronger, and better able to stand these pickings.

Now, it may be three, four, five, or even six years, before the cultivator obtains even his first light picking, and this depends upon the mode of planting, character of the soil, peculiarity of climate and season, and the care bestowed upon the cultivation. From this statement it is the more readily seen, why the Chinaman lays under contribution, the roots of all the wild tea plants he can find, to commence his plantation with, rather than wait five years for plants from seed.

When the Chinaman does sow tea seeds, or plant out young seedlings in his fields, it must be observed that he generally sows other plants (annuals) between the rows, so as to obtain something from the land during the growth of his tea shrubs, always taking care not to injure these by his inter-culture.

I cannot pretend to enter more fully into the subject of cultivation here, as my time and space are so limited, but the few remarks I have made will serve to give a tolerably clear idea of the requirements of the tea plant.

MANUFACTURE, CONSUMPTION, AND ADULTERATION.

A few very brief observations upon the manufacture of tea will, I am sure, be interesting, if only to clear up in the minds of many, the question of "green *v.* black" teas. It is true that all I can say may be found in certain books that have been published on this subject; but, after all, how few amongst us ever see these books, or know anything about the modes of making green or black tea.

It is comparatively but very lately that even the most scientific and best informed men in Europe believed that it required the leaves of one particular variety, therefore designated "the green tea plant," to make the green tea of commerce, and those of another, the *Bohea*, to produce the black tea. The researches in China of Fortune and of Ball, together with the actual proofs furnished by the Chinese tea makers in India, have however, completely settled the truth of the matter. It is quite probable that the *Thea Viridis*, so much cultivated in the northern provinces of China, may furnish a better and brighter green tea than the *Thea Bohea*, but we cannot assert that it does so with any degree of certainty. It is, however, quite certain that both green and black tea can be made from either shrub, the result depending entirely upon the mode of manufacture; and the explanation of this difference in treating the leaves is so striking, and yet so simple, that any child can comprehend it at once. It is as follows:—

To make green tea, the leaves are picked clean, without any part of the stem or foot stalk (of the leaves) remaining attached to them. They are then taken at once to the roasting-pan (or kuo), and receive their first roasting. If the freshly picked leaves accumulate faster than the roaster can dispose of them, the greatest care must be taken to keep them from the action of the sun, and from heating by fermentation, in either of which cases they would turn yellow, and be spoiled for green tea making. Immediately after the first roasting, the hot leaves undergo the process of rolling, pressing, and twisting; they are then placed in basket-trays or sieves, in a cool room, until all the leaves have been once roasted and rolled. The second roasting brings them to a drier state, and to a dark olive-brown colour; and after having been again cooled in the basket-trays as before, they receive their third and last roasting, which brings out that blue-green tint (resembling the bloom on fruit), for which the best Hyson teas are so remarkable.* (*Vide* Ball, chap. 9.) In making black tea, not only the leaves, but portions of the very young, succulent tops, and even the unopened buds are plucked; but these freshly gathered parts of the plant are not roasted at once, as in the previous case, but are exposed on trays (in layers some six inches deep), very frequently to the sun,—are tossed about until they become soft and flaccid, change colour and are spotted: showing that they have absorbed oxygen, and that their juices have undergone certain chemical transformations. They give out a peculiar fragrance, and altogether the result is somewhat analogous to the changes brought about in making hay. These leaves are then roasted, rolled, and pressed, and lastly dried on a poey over a charcoal fire. Mr. Ball gives a very concise sketch† of the whole process, in a rapid kind of summary, which I quote:—"Place the leaves in a sieve; expose them to sun and air; toss them and turn them, as hay; then place them in the shade till they give out a certain degree of fragrance; then roast them in an iron vessel; roll them with hands or feet; and finally dry them over a charcoal fire—and you will have fair Congou tea."‡

Those who wish to study the whole art of manipulation practiced by the Chinese in making the various kinds of green and black teas, must have recourse to the works of Ball, Kaempfer, and others, who have entered into the subject in all its details, which certainly are most interesting.

The Chinese use several flowers, such as the Chu Lan (*Chloranthus inconspicuus*), Pac Sheem (*Gardenia florida*), Kuey-Hoa (*Olea fragrans*), and the Moo-Ly-Hoa (*Jasminum Sambac*), for scenting their teas; and the whitish powder, so frequently noticed amongst some of the green and black teas, is often nothing but that of the Chu Lan flower.

In England we think that we are paying pretty high prices when we give 4s. 6d. per lb. for black, and 5s. 6d. for green tea; and, considering the nature and composition of the articles we get, perhaps we are justified in grumbling; but it is refreshing to know that if the Russians do really get the good tea, of which they boast, they at least pay tolerably exorbitant prices for it; in some cases as high as 50s. sterling per pound. If this be an almost incredible price to pay for tea in Russia, what will be thought of the same price (50s. per pound) being paid by the princes and superior mandarins of China, for tea made in their very neighbourhoods? Yet this is absolutely true, and serves to show us how very highly the best teas of China are prized by her own people, who undoubtedly possess a delicate and refined taste for tea, such as we can scarcely comprehend.

When I was living in the Straits Settlements (Malacca), I have had presents, made me by rich Chinamen, of small packets of Mandarin tea, which no European can obtain by purchase; and I must say that it was the most delightful I can ever hope to taste; and in those days I drank tea in Chinese fashion, without milk or sugar. Nevertheless, I I am free to confess that I should decidedly object to pay 50s. a pound for such tea, although it was much superior to any the Russians obtain.

The vast bulk of the tea made in China is undoubtedly of very middling or even inferior quality, whilst there is also an immense quantity of very poor stuff indeed, part which is used by the very poorest classes of Chinese, and the remainder for mixing with better teas, for European consumption.

We have no very certain means of estimating the exact quantity of tea consumed in China, but we may nevertheless draw conclusions from such data as we possess. Taking

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* The Chinese also "get up" adulterated teas, in imitation of this natural bloom.

† Page 141.

‡ Bruce, on Assam tea, writes in 1840:—I am now plucking leaves for both black and green tea, from the same tract and from the same plants; the difference lies in the manufacture, and nothing else.

the population of the country, then, at 400 millions, and considering that the use of tea is universal amongst them; that they drink it from early morning until they retire for the night; that in sickness or health, working or resting, travelling or at home, it is the one great national beverage, without which no Chinese family could live and thrive; considering all this, I think I am not over-rating it when I set it down at an average of 5 lbs. a head per annum, or a total of 2,000,000,000 of lbs.! Now if we allow 100 lbs. of cured tea as the average produce per acre in China, this will show a cultivation of 20,000,000 acres in tea alone, whereas I am more inclined to estimate it at 25 million acres. Just let us compare this with other cultures in other countries. France, which is not larger than one of the Chinese provinces, and contains less than one-twelfth the population of China, has, nevertheless, five million acres in vines. The Southern States of America have seven million acres in cotton, cultivated by less than one and a half million of negroes; and India, with only half the population of China, has 14 million acres in cotton. These comparisons are quite sufficient I think to prove that there is no improbability attached to the estimate I have given of the extent of land devoted to tea culture in China; I therefore leave out of the question the area occupied in different countries by such crops as rice, wheat, &c.

If we allow that the internal consumption of tea in China amounts to 2,000 millions of pounds, we cannot but be struck with the comparatively small quantity she exports; for according to the latest statistics, we find that her total export of tea to all countries, does not reach 200,000,000 lbs., being less than one-tenth of her own consumption. Of this quantity the United Kingdom took about 78 million lbs. in 1860, her consumption being about 79 million lbs.

Going back 30 years, we note the gradual increase of consumption in Great Britain and Ireland, viz.:—

In 1820	22,452,050
1830	30,047,079
1840	32,252,628
1850	51,172,302
1859	76,328,131*

and although we have no official return for 1860 as yet, I assume the consumption to have been about 79 million lbs., or less than the twenty-fifth part of the quantity consumed in China. I should be much pleased if I could say that the tea consumed in this country is pure and unadulterated; unhappily, I am compelled to present to your view a picture the very reverse of this.

From time immemorial, the Chinese have been in the habit, more or less, of adulterating their teas, but, until a very recent period, those teas were consumed at home, and seldom, if ever sold to Europeans.† They, however, observed that the European dealers residing in Chinese ports practised this little "art and mystery" themselves, upon almost all the teas they bought, previous to shipping them. Now "John Chinaman," who is an observing and highly imitative animal, seeing this interesting and lucrative business, transacted so extensively under his very nose, and that, too, from month to month, and year to year, began to take counsel with himself, and speedily arrived at the conclusion, that he was a great fool for surrendering this very pretty "pigeon"‡ to such bungling "foreign devils."

We shall be in a position to appreciate the zeal with which our celestial friends set about remedying this poaching upon their own domain, when we find, that, in 1859, of the tea purchased by dealers in China, seven-eighths was adulterated. The fact is, "John Chinaman" had "improved the occasion," and entirely taken this little "pigeon" out of the European trader's hands, by selling him teas, largely adulterated it is true, but certainly most artistically got up. It mattered not whether the teas were purchased in Canton or in the northern ports, the beautiful ingenuity of the Chinaman was as apparent in the one as in the other; and our circumvented traders groaned aloud. What was to be done? No one could tell; so they called a "meeting," to consider the subject, and, on the 18th of April last, they met and compared notes. The immense quantity of "lie" tea, prepared for admixture by the Chinese, was mentioned; the cargoes of unsound leaf, brought from Japan, to be "doctored" and mixed with other tea, were enumerated; and an interesting account was given of three plants, the leaves of which are largely employed in adulterating teas. These are, *Gynura auriculata*, a drug which is stimulant and slightly acid, *Ardisia erispa*, and a common mint. The meeting came to the doleful and indignant conclusion, that seven-eighths of the tea they purchased was grievously adulterated, and that "John Chinaman" was a great rogue.

But in good truth this is no joke, especially when we consider that these 76 millions of lbs. ($\frac{7}{8}$ths of which is adulterated), has yet to pass through the hands of our own manipulating dealers. What it undergoes during this perilous ordeal we can only guess at, although the reports of the excise officers, and the cases in the several magistrates' courts, give us a faint idea of the nefarious practices resorted to. It was but a week or two ago that upwards of 2,000 lbs. weight of pure English "lie" tea, was seized by the officers, who admiringly pronounced it to be "splendidly got up, and calculated to deceive the eye of anyone." When this "manufactory" was entered by the officers, its enterprising proprietors were doing extensive business in supplying their home-made "article" *to the trade.* Now, what with the "lie" tea of China and the "lie" tea of England, many begin to regard the tea of our shops, as being a huge "lie" altogether. For myself, I cling to the comforting assurance that the Chinese do sell us one-eighth (of the whole quantity), or 9½ million lbs. unadulterated, and I try to believe that this is not tampered with in any way, but comes to us pure and wholesome. Those who deal with tea merchants of high character will have no difficulty in joining me in this belief. Who is it, then, that suffers from these double frauds? It is the million. And the lower the class, the greater are the impositions we see practised upon them; until we cannot but repeat that exclamation, which, in very bitterness of spirit, a good and tender-hearted man gave vent to, "God help the poor!"

This Society, so practical in its purposes, so beneficent in its labours, and so potent for good, may it not legitimately afford its aid in securing to the millions of our country pure and wholesome articles of food? A legislative enactment has recently been passed against the adulteration of articles used as food, but we want the country to be roused from one end to the other, on this great domestic evil, so that it may be effectually put down. But whilst looking to this legislative enactment, let us not lose sight of what we may ourselves do towards remedying the evil complained of in the matter of tea. We want a very abundant supply of good pure, wholesome, and cheap tea; and we can get it if we only make up of our minds to attempt it. To prove this we must leave Chinese ground, and take a view of other

Tea-producing Countries.

As the cultivation of tea involves considerations of a £. s. d. character, it is necessary to show what an acre of tea plants will yield per annum under favourable circumstances, and when arrived at full bearing.

From 200 to 300 lbs. of cured tea is by no means an uncommon return from one acre of land, which at the present average price of 2s. per lb. would exhibit a money value of from £20 to £30; certainly a very valuable crop. As I have shown, the tea plant is exceedingly hardy, and the manufacture of its leaves, by no means a difficult or

* It is quite worthy of remark that the quantity of coffee consumed is just one-half that of tea.

† Although the East India Company, in their day, purchased little but tea of second and third quality, yet their buyers took care that all they bought was pure and genuine.

‡ Canton-English for "business."

expensive process. Little or no capital is necessary for buildings or utensils, and the worst that can be said against it is, that the planter has to wait four or five years before he can begin to pick his leaves. On the other hand, once in bearing, his shrubs will last a life-time or longer, requiring little culture, and but little manuring.* The two continents of America† afford a vast field for this culture, could cheap labour be depended upon there, Brazils being the only portion of it in which it is now cultivated.‡ Madeira, Teneriffe, Portugal, Spain, France, Algeria, Italy, Austria, Turkey, and the Crimea, might all grow tea, for their climates are quite suitable; Australia, Tasmania, and New Zealand are admirably adapted likewise, but they have little or no labour to bestow on such a cultivation. Java has long taken up tea culture, and produces some millions of lbs. But the country to which I wish to direct especial attention is our own glorious India. Glorious, indeed, she would be to us, if we only availed ourselves of her vast productive resources—resources which would supply our manufactures with raw materials in profusion—which would rejoice the hearts and stomachs of our hard-working people—which would enrich her own teeming population—which would cover her rivers with steam-boats, and her land with railways—which would make her peaceful, happy, and contented, and which would confer on England an enduring blessing. I have already said that the tea plant is indigenous in several parts of India, but the localities in which it may be profitably cultivated in that country, are more numerous than I should like to state, but amongst the many I may safely mention Assam, Sylhet, Cherra Ponjee, Darjeeling, and the Sikkim hills, Kumaon and Gurhwal, Nynee Tal, Deyrah Dhoon, Kangra Valley, and other parts of the Punjab, and Cashmere;—the table-land of Omerkantak (in Central India), and the Neilgherries, Coorg, and Travancore (in the Madras Presidency). It has also been grown, and I believe would admirably succeed, at Palamow, Chota Nagpore, Hazareebaugh, Burdwan, and the Blue mountain in Chittagong. Now, in all conscience, here is space enough to grow tea to supply the whole world, and the cheapness of labour would enable the Indian tea-planter to undersell even the Chinese, who now command the markets of the world.§

In consequence of the discovery of indigenous tea in Assam, the Bengal government commenced some experimental plantations at Seebsangur, and other points, in the year 1835, and they came under the superintendence of Mr. Bruce, who first discovered the plant in Assam, and some years afterwards of Mr. J. W. Masters. Of all the localities for tea in Assam, Mr. Masters gave a decided preference to Satsoeah, and emphatically pronounced it to be the most valuable tea locality known. These plantations were afterwards sold (in 1839) to the Assam Tea Company, who, after floundering about for a long time, at length got under good and able management, and can now boast of some 4,000 acres of land under culture, yielding somewhat less than 1,000,000 lbs. of tea last season. Their tea sells in the English market at from 9d. to 4s. per lb., but averaging all round 2s. per lb. The character of this tea is strong, coarse, harsh, and astringent; qualities which render it very valuable here for mixing with the poor, flavourless rubbish, which is imported so largely from China; hence, Assam tea is in great demand, and commands higher rates than even the best Chinese. The Assam Tea Company, then, is a great success, paying, according to report, upwards of 15 per cent. upon the capital invested. I am sorry that I cannot be more certain on this point, but it strikes me that this Company is so very successful, that they do not desire any interlopers to jostle them in Assam, hence they refuse to afford any information as to their operations or financial position.

There has been another company recently formed, named "The Jorehaut Tea Company," Seeb Saugor District, Upper Assam, but being a private company, the public are not admitted to their confidence. There are also several individuals cultivating tea in Assam.

The chief difficulty complained of in Assam, is the want of sufficient labour, but how this can be, when Coolies are taken to the Mauritius, I cannot comprehend. Another disadvantage of Assam is the long and tedious water carriage to and from Calcutta; so that upon the whole, I do not think the Assam Company need alarm themselves as to strangers selecting Upper Assam as the scene of their intended tea operations. I can hardly imagine any prudent man passing so desirable and healthy a locality as the hills in the neighbourhood of Sylhet and of Jynteah (where tea abounds in a wild state), to settle in so unhealthy and so distant a place as Assam.

But the operations which are deserving of our most earnest attention, are those, which the Indian Government has been for so many years carrying on, in the North Western Provinces, under the able and judicious management of Dr. W. Jameson. These experiments commenced in 1835-6, and have gone on gradually extending until they have now assumed very imposing dimensions.

In 1859, these tea plantations consisted of—

In the Kangra Valley	800 acres, and	2 factories		
,, Deyrah Dhoon	400 ,,	,,	1	,,
,, East Gurhwal (Poorie)	350 ,,	,,	1	,,
,, Kumaon	700 ,,	,,	3	,,
Total.........	2,250 ,,	,,	7	,,

The Bohea variety is that principally cultivated on these plantations, although there are some of the Assam variety here and there intermixed.

Government established these experimental plantations, with a view of testing the suitability of these several localities,—of demonstrating the profitable character of such a culture in that part of India,—and of inducing both Europeans and natives to adopt it. In this object, Government has certainly had considerable success, for, according to Dr. Jameson, there were, in 1859—"In the Kangra Valley (Punjab), one European, a Mr. Berkeley, and about 100 natives, cultivating the tea-plant on their own account. In the Pinjora Valley, the Rajah of Patialiah has commenced a plantation, and to these parties upwards of 20,000 plants and 21,840 lbs. of seeds have been distributed this season.

"In the Deyrah Dhoon the following parties are now cultivating tea:—

1. Col. Elwell.	5. Gen. Dick.
2. Maj. Thelwall.	6. Gen. Swetenham.
3. Maj. Thomas.	7. Maj. Rind.
4. Gen. Wilkinson.	8. Capt. Murray.

* Four lbs. of fresh leaves will cure into one lb. of tea.

† In the Transactions of the American Institute, 1856, is the following:—"In the year 1846, a valued member of this Institute, Junius Smith, having an intelligent daughter resident in India, employed her to obtain tea plants and tea nuts for him. She succeeded, and he commenced the formation of a tea plantation in the Uplands of South Carolina. He prepared a valuable paper on tea, which was published in our volume of Transactions of 1847. Dr. Smith received no encouragement. His little plantation was flourishing, when he was assailed by some wretches there; he was attacked, came back to New York, and soon died of the wounds he had received." The fact was, that his low white neighbours, being in the habit of walking into his plantation whenever they pleased, and taking away his tea plants, caused him to remonstrate with them, and to put up a fence, upon which these aggrieved gentry waylaid and shot him down!

‡ This culture was first commenced, and Chinese introduced into Brazil in 1810; then again in 1817; and there is now a very large extent of land devoted to it, and quantities of tea made, principally in the high lands of St. Paul's and of Santa Catharina.

§ It is estimated by the most competent authorities, that the Chinese cannot sell good, pure teas, under 10d. to 11d. per lb. whereas India might produce it at from 4d. to 6d. per lb., when more extensively cultivated; and Java at 8d.

9. Mr. Todd.	16. Mohun Sing.
10. Gen. Vincent.	17. Parutam Dass.
11. Gen. Hoggan.	18. Nand Lall.
12. Mr. Troup.	19. Buctawa Sing.
13. Mr. Hawkesworth.	20. Nuneyah Lall.
14. Rajah Lall Sing.	21. Surup Doss.
15. Ram Nath.	

to whom upwards of 80,000 seedlings and 25,200 lbs. of seeds have been this season distributed. The tea planters in Gurhwal and in Kumaon are:—

1. Mr. Richards.	6. Mr. McIver.
2. Capt. Cumberland.	7. Mr. Warrand.
3. Juggut Ram.	8. Syce Ram.
4. Mr. Wheeler.	9. Dowlut Sing.
5. Mr. Lyall.	

to whom upwards of 80,000 seedlings and 25,200 lbs. of seeds have been given. In addition to these, 14,280 lbs. of seeds have been sent to Darjeeling, to parties cultivating tea there. It will thus be seen, that during the season (1859) there have been distributed gratis, from the Government plantations, to private individuals cultivating tea, upwards of 36½ tons of tea seeds, and 1,800,000 young tea plants. One planter in the Dhoon produced, this (1859) season, 8,000 lbs. of tea, which was prepared by natives trained in the Government factories, whilst another planter in Kumaon produced about 500 lbs.; these teas realising here 11s. 9d. per lb."

It must be acknowledged, that Government has acted most liberally in supplying plants and seeds to those who have embarked in this culture, and whoever will read the note appended to this* will see that in respect to making grants of suitable land the Government regulations are extremely liberal also.

No one need be under any apprehension that all the suitable lands will be immediately occupied in this particular part of India, as the following report by Dr. Jameson will shew. Lands adapted for tea culture:—

	Acres.
In Kumaon	350,000
Eastern Gurhwal	180,000
Western Gurhwal	180,000
Deyrah Dhoon	100,000
Tounsar Bawar	10,000
Kooloo and protected Hill States	230,000
Kangra Valley	30,000
Total	1,080,000

Which, if stocked with tea plants, would even at the low average rate of 100 lbs. per acre, annually produce 108 million lbs. of tea. This would be some 30 million lbs. more than the annual consumption of the United Kingdom.† After all, this area is really a very small portion of the lands which might be obtained by the tea-planter, as I will presently shew. The cultivation at the Government plantations has been an enormous success. They contained (February, 1859) upwards of 16,000,000 of tea plants, all in the most flourishing condition, and yielding large quantities of excellent tea, which sells readily on the spot at 4s. per lb. Full-bearing shrubs (Dr. Jameson states) yield 300 lbs. of cured tea per acre, and younger plants in like proportion; but the average of a whole plantation in full bearing may be calculated only at about 200 lbs. per acre. Mr. Davies, Secretary to the Government of the Punjab and its dependencies, writing from Lahore, on the 11th of June, 1859, to the Government of India, says of the Kangra Valley plantation:—"It now occupies 800 acres, bearing some five million plants. It is estimated that the produce this year will amount to 26,000 lbs. of excellent tea, valued at £5,200, and that when in full bearing, the yield will increase to so large an amount as 150,000 lbs. The expenses are computed at £1,600 per annum—there is, therefore, a very considerable profit; besides which, vast quantities of seedlings and seeds are distributed gratis, &c."

Dr. Jameson, in his report to Government, July 20th, 1859, says:—"The Deyrah Dhoon and Kangra plantations (containing together 1,200 acres in tea shrubs) will this season yield 70,000 lbs. of tea, which, at the market rate, may be estimated at £14,000, whilst the expense of working them may be set down, at the very outside, at £4,000, which will leave a clear profit of £10,000. This will be largely increased next year, when these plantations may be expected to produce 100,000 lbs. of tea." It must be observed that these two plantations were expected to yield a clear profit of £10,000 on the crop of 1859, although they have not nearly arrived at perfection; the great proportion of their shrubs being at that time only very young. Nothing can possibly serve more clearly to demonstrate the profitable character of this simple and inexpensive cultivation, than these plain, straightforward, official reports of Dr. Jameson; and I take this opportunity of returning my grateful thanks to my kind friend Dr. Forbes Watson, of the India House, for lending me these important documents, and the splendid map now on the wall. The production of tea having thus been incontestibly proved to be a great success in the north-west of India, the Government contemplate disposing of all these valuable plantations, except one, which it is proposed by Dr. Jameson to retain, in order that the "grant holders" and native cultivators may still be supplied by government with seeds and seedlings; but the Governor-General has very sagaciously requested Dr. Jameson to consider well whether one single plantation will be sufficient to supply the demand for seed and seedlings; and I do sincerely hope that Dr. Jameson will, upon reflection, recommend government to retain two plantations at least.

Past and present experience teaches us that companies do not like anything in the shape of competition, especially in their own immediate neighbourhood; and I am thoroughly convinced that they would use the tea-seeds for manure, or burn them, rather than supply them to persons wishing to cultivate tea in their part of the country. The public at large and the Government may look at such a matter as a great national object, but a "company" views it as a matter of private interest, far too sacred to be interfered with. Let us hope, then, that the Governor-General's suggestion will be acted upon, and that two of these very profitable plantations will be held in hand by Government, to promote the extension of tea culture. Previous to any of them being sold, they are to be extensively advertised in the newspapers, that the public may have an opportunity of competing for their purchase. This is as it should be.

I must not omit to mention that tea culture in the Himalaya is a very healthful and enjoyable occupation, for with a manager or overseer on the plantation, the proprietor and his family may reside in some delightful locality, like "Nynee Tal," that lovely mountain lake which has been aptly designated "the gem of the Himalayas." Here, in the most desirable society, he and his may enjoy the pleasures of boating, fishing, shooting, and hunting, as well as all the manly games peculiar to Old

* Government grants of land in Kumaon and Gurhwal for tea culture—from 200 to 2,000 acres to each person—on following terms and conditions:—Lease for 20 years; first four years, free; fifth year, one anna (1½d.) per acre; sixth year, two annas; seventh year, three annas, and so on, adding one anna every year, until the twentieth and last year the maximum of one rupee is reached. At close of fifth year, one-twentieth part of the land to be cleared and planted in tea; at close of tenth year, one-fifth; close of fifteenth year, half; and at close of twentieth year, three-fourths of said area to be cleared and well-stocked with tea plants. In failure of said conditions, "grant" forfeited, and liable to be taken away. Government guaranteeing to supply plants and seeds gratis to applicants so long as Government tea plantations are maintained. (*Vide* "Dr. Jameson's Report," 1859.)

† From the report of Major Lake (the Commissioner and Superintendent of the Trans-sutlej states) it is evident that in the Kangra hill district there are waste lands fitted for tea, amounting to 1,157,382 acres; which are all available to applicants.

England, whilst his children retain the rosy cheeks of Europe, and may procure an excellent education at the schools that have been established at this charming retreat. And lastly, though by no means the least important consideration, for many years to come prices will be obtained for Himalaya teas on the spot, nearly double those afforded by the British markets. This arises from the enormous internal consumption that is gradually and surely being established; indeed, no one can tell to what wonderful extent this may yet reach, but I am firmly convinced that tea is destined to become, at no distant day, the great national beverage of India.

In the Neelgherrie mountains (on the South West coast) tea seems to flourish quite as well as in the North West Provinces; likewise at Koonoor, at Coorg, and at Travancore; in all which places Dr. Cleghorn tells us it succeeds perfectly. There are no doubt millions of acres in these countries, as suitable to its growth as the Himalayan localities we have just been discussing, so we see that India may yet rival China both in the quantity and in the quality of her teas. There is but one country more to which I would direct especial attention in respect to the production of tea, and that is our beautiful and salubrious colony of Natal.

At first sight it appears improbable that it can be grown and manufactured there at a profit, but a practical knowledge of the colony induces me to believe that, a company could establish a five-thousand acre plantation there, more speedily, more cheaply, and more advantageously, than in any other country. Every acre could be prepared by steam-power; every acre could be "hoed and cleaned" by steam, until the trees began to furnish leaves for picking; and I believe that every ounce of leaf could be manufactured into good and valuable black teas by the most simple and inexpensive machinery. The only apparent difficulty would be in obtaining an adequate supply of seeds and plants; but in reality this could easily be overcome, and at no great expense, as tea shrubs abound in the Mauritius and in Bourbon, from which quantities of seed might be obtained; or they might be brought from China direct, by ship-loads, if packed in a peculiar manner, so as to preserve their germinating power. From her own possessions, therefore, England might obtain all the tea she can consume, and that, too, of a pure and thoroughly wholesome quality, instead of sending to China so many millions sterling of silver to purchase an adulterated and dishonest article.

British capitalists will subscribe any amount of money to construct railways or anything else in the United States, the Brazils, or other foreign country, which may to-morrow repudiate them and their claims; but, here, in our own India, a safe and profitable investment may be made of many millions sterling. Let our monied men look, then, to this abundant source of wealth, from which they themselves may derive very large dividends, whilst their fructifying capital is, at the same time, conferring manifold benefits upon India and upon their own native land.

DISCUSSION.

The CHAIRMAN said the interesting paper they had just heard was well worthy of their attention, and he hoped that many present who, like himself, were acquainted with countries where tea was produced and with the tea trade, would make some remarks. His own personal experience confirmed a great deal they had heard that evening, and he should be happy to have the views of those present upon this interesting subject.

Mr. T. A. MALONE in allusion to the description given in the paper of the mode of drinking tea in China without either milk or sugar, begged to inquire whether it was taken as a strong infusion or the reverse. In the recent interesting accounts from China, he had read that tea was presented to our countrymen negociating there, which was described as being very weak and particularly disagreeable to the taste. It would therefore be interesting to know what was the general custom of the Chinese in this matter. From what was stated in the paper with regard to the extent to which that article was adulterated, he thought they would rather be driven back to Sir John Barleycorn, and would prefer the malt tax to drinking such a compound as it was alleged they now got under the designation of tea. While on this subject he would mention a fact, that had recently come under his notice from undoubted authority. He had had put into his hand a substance which he was told was extensively used in the adulteration of tea. It was a substance called *Valonia*, and was said to be the cup of the acorn of a foreign oak. It contained a large quantity of tannin or astringent matter. People generally preferred full-flavoured tea, and it was said that much of the adulteration was due to that circumstance. The flavour so much approved could, he believed, be imparted by the admixture of certain astringent materials; and if it were generally known that it was by this means the full rough flavour was imparted to tea, it might tend in a great degree to alter the public taste in that respect; for he believed until they succeeded in acting upon public opinion, they should do very little good in these matters. He would mention, with regard to the transporting of the tea plants, that under the old method employed for that purpose, the majority of the plants died off before reaching their destination; but there would be no difficulty in transmitting the plants to Natal or elsewhere in Ward's cases; and those who had used them found that only a small per centage of the plants were lost.

Mr. ROBERT DAWBARN was anxious to learn whether any ready test could be applied for the detection of the alleged adulteration of tea. He did not refer so much to the adulteration in this country as to the original adulteration in China. If any gentleman present could inform them as to a good test for the detection of the original adulteration, it would be a great practical benefit. It was certainly a fearful thing to contemplate the extensive adulteration of an article which entered so largely into our domestic consumption. He was willing to think there had been some little exaggeration or error on that subject. Mr. Wray had stated that the proportion of green tea used in this country was only as 1 lb. to 50 lbs. of black tea. If that were the case, it was very different from what it used to be.

Mr. WRAY said, taking the average throughout England, 50 lbs. of black tea were used to 1 lb. of green.*

Mr. DAWBARN added that the general reputation of the tea market at the present time was that more good tea was now brought in than was formerly the case. The great argument against the progressive duties upon the importation of tea was that there were no means of distinguishing between the different sorts, but in practice this difficulty had been solved. He could state that in the Eastern Counties a much larger proportion of green tea than that stated by Mr. Wray was used. There was nothing that respectable merchants and traders detested so much as adulteration; but with regard to tea he was afraid the fact was too strong to be denied, and the great object was to ascertain some simple test by which it might be detected. In districts of the country where the water was soft, he believed there was not that desire for the rough-flavoured teas which had been alluded to by the last speaker.

Mr. H. C. WHITE believed the statement that seven-eighths of the tea brought into England was adulterated to be a great exaggeration. Large quantities of tea passed

* According to the Customs Returns for 1860, it appears that the importation of tea was as follows:—

	lbs.
Black	81,636,000
Green	10,064,000

and the delivery for consumption was—

Black	75,457,000
Green	10,743,000

—ED. *J. S. A.*

through his hands annually, and he could state, as the result of an extensive practical experience, that adulterated tea was the exception, and not the rule. With regard to the relative proportions of black and green teas consumed in this country, he believed one-tenth to be nearer the fact than one-fiftieth. He thought it was a pity that it should go forth that there was such an amount of adulteration of tea as had been stated by Mr. Wray. He was sure there was nothing like that extent of adulteration in tea, and he repeated that spurious tea from China was quite an exception. The last speaker had expressed a great anxiety to discover a test for the adulteration of tea. He (Mr. White) would say, the most infallible test in such cases was the public palate. People for the most part knew what good tea was. Mr. Wray had commiserated the poor, who he said drank the worst descriptions of tea, but he (Mr. White) must be permitted to say that the poor were the best judges of tea; and in the poorest neighbourhoods good tea could be obtained if a proper price were paid for it, and with very little, if any, adulteration. There was a great tendency in the present day to exaggerate these matters, and to find out cases of adulteration, to which a high colouring was given; but he repeated that his own experience had been that spurious tea was the exception, and when met with it was cast aside as being almost worthless.

Mr. James Leonard begged to offer his individual thanks to the gentleman who had in so able a manner brought before them that evening the interesting subject of the production of tea. For many years, dating from 1839, he had taken a great interest in this subject, and it had been a delight to him to hear many of the facts this evening, the data for which had, in a great measure passed through his own hands at the period to which he referred. It so happened that the whole of the correspondence of Mr. Bruce passed through his hands at that time, and he was able to lay on the table a condensed abstract of these letters which gave rise to the formation of the Assam Tea Company. The late Mr. Sheriff Rogers took a great interest in this matter, and it was that gentleman whom he addressed in a pamphlet on this subject, and it had given him much pleasure to hear, through Mr. Wray, this evening, a confirmation of the opinion he was then able to form of the great chances of success that were likely to attend the formation of such a company upon the invaluable information that was furnished in the letters of Mr. Bruce. How they had met with success Mr. Wray had informed them, and there was no doubt whatever that excellent tea could be produced in our own dominions, if there were hands enough to cultivate and manufacture it. There had been a great deal of enterprise shown in this matter, and the Government had come forward and ably supported it; but there was still room for a very large employment of capital in this direction. With regard to the question of adulteration he could say, from his connection with some of the first tea houses in China, that they could only hope to prevent the importation of spurious teas, by trusting to the honour of the gentlemen who there made the purchases. He was certain that what Mr. Wray had mentioned as to the meeting held last April, was a guarantee to this country that our friends in China were wide awake to the necessity of sending good teas to this country; and he was very certain that when the matter was properly ventilated, as it would be in such a meeting as the present, and went before the country, they would be cheered on to continue their efforts to supply the home market with good teas. With regard to the success of the Assam Tea Company, it was gratifying to know that the opinion which was formed of the enterprise in 1839 was a correct one. He saw himself surrounded by gentlemen largely involved in the question of the purity of teas, and although they might not be able altogether to avoid adulteration, he believed the energies of their merchants would never flag in endeavouring to supply the country with an excellent article.

Dr. Forbes Watson remarked that he was sure there could be only one sentiment of indebtedness to Mr. Wray for having so well brought forward this subject. No doubt in dealing with such a matter as this they might pick out some things to object to, but the subject itself was one of vast national importance. Personally he expressed his thanks to Mr. Wray for the excellent way in which he had handled the materials which he (Dr. Watson) had felt it no less a pleasure than a duty to place at that gentleman's disposal for the purposes of this paper. The national importance of the subject might be gathered from statistical facts indicating the rapid increase in the quantity of tea consumed by the people of this country. Twenty years ago, they found that the average quantity per head of population in England was 1 lb. 6 oz.; last year, assuming that 80,000,000 lbs. were consumed in this country, and taking the population at 30,000,000, the quantity was represented by the amount of 2 lbs. 10 ozs. per head, or nearly double what it was twenty years ago. Seeing, therefore, that twenty years ago the middle and upper classes drank about the same quantity of tea as at present, it followed that the lower classes were beginning to drink more largely of tea, and therefore Mr. Wray was warranted in looking out for sources of good, wholesome tea for them. One word upon the subject of the antiquity of tea. He was disposed to differ from the notion that tea was drunk by the Chinese thousands of years before the building of the great pyramids, inasmuch as it was even doubtful whether that people then existed. With regard to the *vexata quæstio* of "species" or "variety," he was not going to discuss it, but would look at the question merely practically. The tea plant was found in Assam, but the question was, whether the plant growing in Assam would furnish the article which was so much required in this country. The answer to that was that it would not. It was true they had a tea which answered well for the purposes of admixture with other qualities, but he doubted whether Mr. Wray, or his friend who spoke last, would like to be compelled to drink Assam tea alone. But still it was of importance to know that they had districts in their own territories in which a tea plant did flourish, because it might be presumed that the plant which furnished *the* tea they all liked would grow there also. Now, it was not the indigenous plant of Assam which they had transferred to the northern parts of India, and which was now cultivated in the government plantations to the extent of 2,000 acres, but the tea plant from China, which the enterprise of government had taken from that country and planted in India. One word as to the question of what they wanted in India, with regard to tea. They wanted the private enterprise and capital of England to be brought to bear upon the matter. Those plantations in India were about to be put up for sale, and it was to be hoped that the attention of capitalists in this country would be directed towards them. There were certain conditions attached to the sale of those plantations, which were indicated in a note by Mr. Wray.* These were considered by the Government essential to secure the extension of the cultivation of tea generally throughout India; and it was not desirable that any one large company should secure a monopoly, but they wished to have several large companies—and certainly the field was sufficiently extensive to afford room for all. It would take a capital of about £600,000 to develop fully the portions of India which furnished the soil and climate adapted to the cultivation of tea. He looked forward with interest to other speakers taking up the question of adulteration further. One gentleman had doubted the assertion that the adulteration was carried to the extent alleged by Mr. Wray. It was a matter of importance that that question should be ventilated. Mr. Wray had made certain statements; but the expression of opinion on the other side was one which demanded respect. They

* See note at p. 146.

were, however, in want of downright facts upon the subject, and it was important that they should get them.

Professor BENTLEY could not allow this interesting subject to pass over without offering one or two remarks upon it. In the first place, with regard to the botanical portion of the subject, it was not necessary to make more than a passing remark. In his own mind there was no question as to the three so called species being merely varieties of the same plant. Some years ago a fact came under his notice which bore out that idea. He had some seed of the *Thea Bohea* sent him, which he planted under different circumstances. The plants that came up were quite as different in character, appearance, and habit coming from the same seed as the other varieties enumerated. He begged to take exception to one statement made by Mr. Wray—that was as to tea being indigenous throughout the wide area of country he had mentioned. As far as botanists were concerned, he did not think they would admit that tea was indigenous in all those districts. So far as he knew, the tea plant was only indigenous, strictly speaking, in Assam and certain parts of India, and was not indigenous in China at all as far as had yet been shown. But that was a country not yet explored, and it might be proved that tea was an indigenous plant there, but at present they could not take it for granted that it was so. Upon the subject of the production of tea, he quite agreed with Mr. Wray as to the immense extent of land under tea cultivation in China. His estimate of the number of acres even exceeded that of Mr. Wray. The consumption of tea throughout the whole world might be computed at 3,000 millions of pounds. Mr. Wray had estimated the number of acres under tea cultivation in China at 20 millions, and had given the average produce per acre at 100 lbs. of dried tea. He (Prof. Bentley) was inclined to think that from 200 to 300 lbs. per acre was nearer the quantity. Seeing that the common price of tea in China was from 8d. to 9d. per lb., a yield of only 100 lbs. per acre would not pay the cultivator. He now came to the next important part of the subject, namely, the adulteration. He confessed he was quite startled when he heard from Mr. Wray that he believed seven-eighths of the tea imported into this country at the present time was adulterated. He could not venture to deny that statement, because his experience did not enable him to do so; but he had made some investigation into the subject, and he must say, as far as his own inquiries had gone, he found upon the whole that, within the last few years, tea was amongst the least adulterated of any articles imported from foreign countries, and therefore he was inclined to think that this statement was an exaggeration, and the more correct figure would be to say one-eighth was adulterated. He wished to have this subject investigated in a fair way, and that every fact bearing upon it should be proved, otherwise the ventilation of it would do more harm than good. With regard to adulteration with such a substance as *Valonia*, he thought such an admixture, if it ever occurred, must have arisen from accident, and not from design.

Dr. LANKESTER, F.R.S., begged to say one word upon this interesting subject. He was struck with Mr. Wray's remarks upon the species of the tea plant, and as that was a subject which was interesting to the scientific world just now, he must say that, after all, they must not be led away with the idea that the mere resemblance between two things established their identity of species. Permanent characters were essential in order to constitute a true characteristic of species. An illustration of this was afforded in the apple and pear of this country. If those trees did not bear fruit, there would be no evident specific difference between them; but the fruit of each partook of a distinctive character, which was never lost. So it was with the tea plant. Some of the products were so different from the generality, especially those of Assam, that he thought they were justified in regarding the Assam tea plant as a distinct species. With regard to the transmission of this plant to different parts of the world, it had borne transportation into districts widely differing from each other. Mr. Wray had recommended experiments in the cultivation of tea in Natal. He (Dr. Lankester) thought that would be a dangerous speculation, and he merely threw out the hint in case persons should attempt it upon insufficient consideration of the subject. There was not only the uncertainty whether the plant would succeed, but there was also the difficulty of getting the labour to apply to its cultivation. That had been the great drawback against the cultivation of cotton in that colony. With regard to adulteration, there could be no doubt it often occurred, but he did not know on what grounds Mr. Wray had placed the extent of the adulterated commodity at seven-eighths of the entire quantity imported into this country. He might mean that inferior kinds of tea were substituted for better kinds. There was no doubt, however, that besides this, injurious substances were sometimes added to the tea as means of adulteration. At anyrate there were enough substances brought in the tea from China, as well as added in this country, to awaken public suspicion, and in this matter we must not always be guided by the respectability of the dealers. If they would not take the trouble to acquaint themselves with the nature of the adulterations, they must have to hear these charges made against them. Within the last fortnight, he had sent to a great warehouse in London for an article, expecting to get it genuine, in order to demonstrate what was genuine as compared with what was adulterated; but it so happened that the article he then procured, afforded the best specimen he could have of adulteration. He went to the head of the firm, and pointed out the fact to him; but he could not make him understand the nature of the adulteration, and he was quite ignorant of the chemical changes that had taken place, and so long as that state of things continued on the part of the traders, so long would they be open to public distrust with regard to the articles of food which they sold. In this respect, therefore, Mr. Wray had done right in calling attention to the subject. With regard to how the dealer might by some simple means detect the adulteration—he would say the very best means of detection was by handing it over, with a fee, to a professional chemist.

Mr. W. G. REYNOLDS, as a practical judge of the qualities of tea, wished to state that he was in the habit of having between 200 and 300 samples in his hands daily, and he would emphatically say that the great bulk of the tea imported into this country during the last ten years was unadulterated. Upon the other points mentioned in the paper he, however, generally agreed with Mr. Wray. Adulteration had been tried; spurious tea had been sent in, so well got-up that at a little distance it would look like gunpowder, but when water was put upon it it was found to be "lie" tea, made of dust sweepings with starch. That description of adulteration had, however, long ceased, because there was no market for such an article. He fully concurred with the opinion expressed by Mr. White, that there were no better judges of good tea than the poorer classes.

Mr. LEONARD WRAY in replying upon the discussion, said, it must be apparent to anyone who prepared a paper of the description he had read that evening, that in making such assertions as he had done, some one would get up and deny them in the most emphatic manner. He had not the least hesitation in stating the authority on which he had made those assertions, but he would in the first instance reply to the inquiry which had been made by Mr. Malone as to the strength of the tea as drunk in China. He had never seen Chinese drink other than a light infusion of tea. At one time he had as many as 300 Chinese in his employ, and they drank what would be called in this country very weak tea, consisting of a light infusion of tea, and not a decoction, and it was always drunk hot. The workmen in his fields on the Straits of Malacca never drank cold water whilst at their labour, but they had buckets of warm tea in the field in the hottest sun under

the equator, by which custom the sensation known as the prickly heat, which was induced by cool drinks, was avoided. With regard to the statement that seven-eighths of the tea sent to this country was adulterated before leaving China, or previously to its being sold to European dealers, he had the authority of the meeting held in Canton in April last. It was then decidedly shown, to the satisfaction of that meeting—composed entirely of tea merchants—that adulteration to that extent was practised upon the tea. He should never have presumed to make such a statement on his own unsupported authority. With regard to the proportion of black and green teas consumed in this country, he had the authority of Mr. Waterhouse, who was himself the firm of Dakin and Co., of St. Paul's Churchyard, and elsewhere, for the statement he had made upon that subject; whilst in America, the great proportion of tea consumed was green tea. It had been stated by Mr. White that the poor were the best judges of the quality of tea, and that the public palate was the best test of the goodness of an article. He would ask in the matter of wine, was the public palate a test of genuineness of the article? And would anyone maintain that the poor ignorant masses were judges of the quality of tea? The palate of the public was what the dealers pleased to make it. They saw that to be the case, especially in the article of butter. A Londoner scarcely knew what genuine butter was. If really good butter were served to consuming customers it would not be bought, because it would not suit the public palate, so much had it been corrupted. With regard to the yield of tea per acre in China, of course he had spoken of it as an average of the entire cultivation of the country. Some good lands would produce, no doubt, from 200 to 300 lbs. per acre of manufactured tea, but in other parts, such as in the hills, where the priests resided, the crop would not amount to anything like 100 lbs. per acre; but, on the other hand, much of this "Padre's tea" sold at twenty shillings per lb. He had spoken of the quantity entirely as an average of production. He could mention that the same remark applied to the cultivation of coffee. Being one day with a party of fellow-planters in the West Indies, he asserted that within a given small circle he could pick out a dozen coffee trees which should yield 10lbs. each. That was much doubted, but the result was he did pick out that number of trees bearing more than that quantity as an average, the smallest yield being 10lbs., and the largest between 13lbs. and 14lbs. upon one tree. But what did they think was the average produce. In Jamaica, once a large coffee producing country, the average production per tree was estimated to be only a quarter of a lb., therefore he adhered to the statement that the average production of cured tea in China certainly did not exceed 100lbs. per acre. With regard to the observations that had been made as to species, he was happy to have had the support of an authority so high as Prof. Bentley, who had distinctly asserted that there was but one species, the others being varieties. He had taken as his authority on this matter the opinions expressed by that eminent botanist, Mr. Masters, who, having been superintendent of Government tea plantations in Assam, and raised the plants from seeds, told them they were not constant, but that they differed very widely. With regard to Dr. Lankester's caution as to the speculation of cultivating tea in Natal, it appeared to him that the assertion that it was taking the plant too far from its original destination could not be supported. The tea plant had succeeded well in the United States, and would no doubt have been extensively cultivated there, if Mr. Junius Smith had not been shot down by a band of ruffians, who insisted upon molesting his property. And even in Brazil they found an enormous quantity of tea was grown. Tea had been cultivated there since 1817, commencing in 1810. In that instance, they found the tea plant transported from one end of the world to the other; and tea was also cultivated with success in the Mauritius and Bourbon, and the reason it was not more extensively cultivated was, no doubt, because sugar paid the planters much better than tea.

Upon the motion of the Chairman, a vote of thanks was passed to Mr. Leonard Wray for his paper.

The paper was illustrated by specimens of the Tea plant, contributed by the Crystal Palace Company; several Chinese drawings, illustrating the production of tea, kindly lent by Mr. Waterhouse; and a large map of India, contributed on the part of the Government of India, by Dr. J. Forbes Watson.

The Secretary announced that on Wednesday evening next, the 30th inst., a paper by Mr. Wentworth L. Scott, "On Food; its adulterations and the methods of detecting them," would be read. On this evening W. H. Bodkin, Esq., Assistant-Judge for Middlesex will preside.

Mr. P. L. Simmonds writes:—The very interesting paper which was read to the members last evening was such as was contemplated from a gentleman of such extended travel and large colonial experience in all that relates to tropical products, as Mr. Wray. Had time permitted, I should have wished to have added a few observations to those made by other speakers. It is, indeed, surprising that with so accommodating a plant, one which soon naturalises itself in many climates, so little should yet have been done to extend its culture in various countries, and especially in our own possessions spread over so many parts of the globe. It was long believed that no one but a Chinese could attend either to the culture or manufacture, but this has been fully disproved in Assam, Brazil, and elsewhere. The tree thrives best between the 25° and 35° North latitude. Its growth is by no means restricted to this range, but there are various other localities and elevations suited to it. Besides the attempts of Mr. Smith, alluded to by Mr. Wray, other efforts are making to grow tea in the United States; the services of Mr. Fortune have been enlisted to send both seeds and young plants; and plantations are to be laid out near Washington with it. Attention is also being drawn to the cultivation and manufacture of this and other staple products, now that the gold is failing there. Extending from 32 to 42 degrees North latitude, producing the orange, the fig, and the olive in the south, and the hardiest fruits in the north, there is a range of climate intervening that would suit the growth of the tea plant precisely, especially the foot hills of the Sierra Novada, and the coast range. Moreover, there are many thousand Chinese in the States, who are familiar with its cultivation and manufacture. Next to ourselves the United States are the most extensive consumers of tea, their consumption being about 32½ millions pounds to a population of 31,000,000; but, unlike the British, they prefer the green or coloured teas.

In the East, the culture of tea has spread very extensively to Cochin China, Japan, Java, &c., and there is no reason why it should not be carried further south into our Australian colonies. I can scarcely go so far as Mr. Wray, in his sweeping allegations as to adulterated tea, although it may be true that, owing to the rebellion, war, and increased demand for export, there may be less of the finer class of teas coming forward. Large quantities of the coarser kind of teas, prepared in Japan, have been shipped during the past year to Shanghai, and thence been re-exported to Great Britain as China tea. But I think the few adulterating leaves, and the "lie," or false tea properly so called, are rather the exceptions than the rule, and the tea purchasers in China have their eyes and wits about them in testing the classes of tea offered. With respect to the extension of tea cultivation in British India—the most encouraging field of operation—this

would add another to the very few important staples of that country, and for which there would always be a demand.

In the report of the Select Committee on Colonisation and Settlement of India, presented in 1859, attention was prominently drawn to the immense supply of tea now gradually being opened to the capital and skill of settlers on the whole line of the Himalayas; and probably in corresponding climates like that of the Neilgherries in other parts of India. It is highly probable that a taste for tea will extend itself over India. There is also reason to hope that the tea of the Himalayas may displace the tea of China in the markets of Central Asia. "The tea plant," say the Messrs. Schlagintweit, "might be cultivated all along the Himalaya range, so as to produce an almost unlimited supply of tea; it is cheaper and better than the tea of China." It appears, also, that there are different qualities of tea (though all apparently good) in different places of cultivation. The culture of the tea plant opens an immense futurity to settlers from Europe.

There is no sort of cultivation, according to the testimony of Col. Vetch, more congenial to European ideas, habits, and constitutions. I think Mr. Wray is rather severe upon the Assam Tea Company. I have always found them most obliging in giving every species of information as to their progress and prospects; and being a public company there can be little or no secresy in their affairs, which are necessarily from time to time made public in their reports issued here and in India in the papers, so that their cultivation, crop, dividend, &c., are always known. In 1840, three years after its formation, the company produced 10,000 lbs. of tea; in 1858, 770,000 lbs.; in 1859, about 800,000 lbs.; the last crop, probably 1,000,000, whilst in a year or two more this yield is expected to be doubled. There are now at least 20 factories in operation in different parts of the province. In Debrooghur, where not long ago the jungle was infested by wild elephants and beasts of prey, there are ten plantations. The cultivation is now extending itself in Middle and Lower, as in Upper Assam. Obstacles to the cultivation, are found in the dangers from fever (which, however, disappears as the jungle is cleared away) and in the dearness of labour, aggravated by the propensity of the Assamese population to consume opium, which causes debility in the constitution and degeneracy in the race. Even the children are consumers of opium in Assam. The Assamese grow it in their gardens. Separated from Assam by the Nagra hills, lies the tea-growing country of Cachar. Before tea cultivation began, this region was almost unknown. Twelve tea companies are stated to be established here. As in Assam, labour is difficult to procure. Assam contains more waste land than would supply all England with tea, and there are thousands upon thousands of acres available for tea cultivation in Cachar.

The *Bengal Harkaru*, daily paper of Calcutta, states that Mr. Henry Mann, an enterprising gentleman who left China about five years ago, has introduced the tea tree to Southern India, having formed a plantation on the Neilgherries, which is now flourishing. The Madras Government has lately published an interesting report upon the subject. The plantation is situated above 2½ miles above Coonoor, at an elevation of 6,000 feet, with an exposure to the north-east, and contains about 6,000 plants. The ground occupied is about four acres. The plantation is on a slope. The forest land is found most suitable for the plants. It now only remains to test the leaf and to procure skilled manufacturers. The cultivation of tea in the hill districts of India seems to be spreading fast, and as these are the localities recommended for European colonization, we may yet see India rivalling China in this trade, and sturdy Anglo-Saxon pickers depicted on the tea chests instead of almond-eyed long-tailed men of China.

General Cullen has also reported to the Madras Government, the successful culture of the tea plant in Travancore. It thrives both at the level of the sea and at altitudes of 1,800 and 3,200 feet. He points to the "Cardamum Hills of Travancore," a tract of land from 50 to 60 miles in length and 10 to 25 in breadth, as admirably suited for the cultivation. The tendency of the plant is to luxuriant growth, but this is checked by selecting ground at high altitudes and with a less humid climate. Government has directed Dr. Cleghorn, the conservator of forests, to visit and report on these tea plantations.

8, Winchester-street, S.W., January 24.

SEAL LOCK FOR MINERS' SAFETY LAMPS.*

A cheap, convenient, and secure means of preventing safety lamps being opened without the certainty of detection, would render explosions of coal mine gases almost impossible, for there is no well-authenticated instance of explosion from a proper safety lamp, and men would not venture to open their lamps if detection were certain, and punishment consequently inevitable. The locks for lamps in common use are not secure, and locks with complex wards and tumblers, though difficult to pick, would be costly and inconvenient.

Mr. Holland, one of the medical inspectors of the Burial Department of the Home Office, has adapted a seal lock for safety lamps, which he freely offers for the use of colliers. It consists of a narrow strip of thin brass, with the ends so punched that they can be locked or riveted together in an instant by squeezing them with pincers. The strip is to be passed round any two parts of the lamp, which must be separated in opening. The lamp cannot be opened without breaking the seal.

The danger from the men lighting pipes by drawing flame through the gauze, may be prevented by surrounding the lamp with a glass, as in Stephenson's lamp and others.

Mr. Holland has just been informed that a lock on a somewhat similar principle has been made, but not much used. He trusts, however, that the plan will be fairly tried, or a better one contrived.

MEETINGS FOR THE ENSUING WEEK.

MON. ...Actuaries, 7.
Entomological, 8. Anniversary.
Geographical, 8½. "North Atlantic Telegraph."—1. Capt. Sir F. L. McClintock, "Surveys of the *Bulldog*." 2. Capt. Allen Young, "Surveys of the *Fox*." 3. Dr. John Rae, "Explorations in the Faroes and Iceland." 4. Mr. F. J. Taylor, "The Fjords of South Greenland." 5. Col. Shaffner, "Electric Circuits."
Medical, 8½. "Dr. Thudichum, "On the physiological and therapeutic effects of the Turkish Bath."
TUES. ...Royal Inst., 3. Prof. Owen, "On Fishes."
Civil Engineers, 8. Continued discussion upon Mr. Braithwaite's paper "On the Rise and Fall of the River Wandle."
WED. ...Society of Arts, 8. Mr. Wentworth L. Scott, "On Food; its Adulterations and the Methods of Detecting them."
Royal Soc. Club, 6.
Royal, 8½.
Antiquaries, 8½.
FRI. ......Archæological Inst., 4.
Royal Inst., 8. Rev. Alex. J. D. D'Orsey, "On the Study of the English Language as an essential part of a University Course."
SAT. ......Asiatic, 3.
Royal Inst., 3. Dr. E. Frankland, "On Inorganic Chemistry."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, January 18th*, 1861.]

Dated 15th November, 1860.

2810. G. Gill, 37, Francis-street, Newington, Surrey—Imp. in "steam rams" and other "ships of war," for the purpose of doing away with the necessity of employing rifled cannon, or other "long range ordnance," against armour plated and other ships in maritime engagements.

* Manufactured by J. Davis, 19, Percival-street, Clerkenwell.

Dated 17th November, 1860.

2828. J. H. Radcliffe, King-street, Oldham, Lancashire—Imp. in lubricating or oiling vessels, and in apparatus connected therewith.

Dated 19th November, 1860.

2836. H. A. Jowett, Sawley, Derbyshire—Imp. in the method of heating or firing ovens for the manufacture of pottery and porcelain by means of gas, and in apparatus connected therewith.

Dated 11th December, 1860.

3036. R. A. Ford and W. A. Paige, 38, Poultry—An improved shirt.

Dated 12th December, 1860.

3051. A. Kyle, Binghill, Aberdeen—Imp. in machinery or apparatus for propelling ships or vessels and boats.

Dated 17th December, 1860.

3092. N. C. Szerelmey, 6, Park-terrace, Brixton-road, Surrey—An improved method of, and apparatus for, purifying oils and varnishes.

Dated 22nd December, 1860.

3144. C. Peters, Coventry—Imp. in looms used in the manufacture of ribbons and other fabrics.

Dated 24th December, 1860.

3156. W. E. Newton, 66, Chancery-lane—An improved archers' bow and bow gun toy. (A com.)

3158. J. L. Norton, 38, Belle Sauvage-yard, Ludgate-hill—Imp. in apparatus for drying wool and other fibres.

Dated 26th December, 1860.

3162. C. Lizars, 36, Rue Lafayette, Paris—Imp. in gas meters.

3164. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in instruments for assisting the sense of hearing. (A com.)

Dated 27th December, 1860.

3166. W. Darby, Birmingham—Imp. in constructing and working stamps for cutting and shaping metals.

3168. W. Parry, High-street, Deptford—Imp. in the manufacture of chimney pots, pedestals, and such like articles made from clay or plastic materials, and machinery for that purpose.

3170. R. A. Brooman, 166, Fleet-street—Imp. in axle boxes and in naves of wheels. (A com.)

3172. W. Hill, 103, Milton-street, and H. Barber, 60, Thomas-street, Sheffield—An imp. in the manufacture of spring knife scales and knife handles.

3174. W. R. Mulley, 10, Lockyer-street, Plymouth—Imp. in apparatus for steering ships or vessels.

3176. A. V. Newton, 66, Chancery-lane—An imp. in the construction of bedsteads. (A com.)

Dated 28th December, 1860.

3180. I. Dimock, Manchester—Imp. in machinery for cleaning, sorting according to size, and doubling silk and other threads. (Partly a com.)

3184. J. S. Russell, Great George-street, Westminster—Imp. in constructing and arming ships and vessels, and also floating and land batteries.

Dated 29th December, 1860.

3186. W. Clark, 53, Chancery-lane—An improved tissue, fabric, or structure. (A com.)

Dated 31st December, 1860.

3191. J. Midgley, J. Sugden, and W. Clapham, Keighley, Yorkshire—Imp. in trombones.

3195. W. Eades, Birmingham—An improved screw-wrench.

3196. W. Clissold, Dudbridge, Gloucestershire—An improved construction of clutch for driving gear.

Dated 1st January, 1861.

1. E. Tomlinson, Manchester—An improved apparatus for facilitating the placing of cop tubes on the spindles of spinning and doubling machines.
2. G. Cook, Croydon—An improved watch movement.
3. M. Henry, 84, Fleet-street—Imp. in breaks applicable to carriages and rolling stock, used on railways and elsewhere. (A com.)
4. M. Henry, 84, Fleet street—An improved slide valve. (A com.)
5. P. Campbell, India-terrace, West India-road, and T. A. Kendal, Cowley-street, St. George's-in-the-East—Imp. in sails and apparatus used therewith.

Dated 2nd January, 1861.

8. J. F. Belfield, Primley-hill, Paignton, Devonshire—Imp. in reaping and mowing machines.
9. W. Morgan, Liverpool—The application of certain metals for the manufacture of "coaling," "swill," and similar baskets.
10. J. Taylor and M. R. Cooper, Liverpool—Imp. in the construction of rotary engines.
11. E. B. West, 24, Longford-terrace, Dublin—Imp. in the process of making worts and washes in brewing and distilling, and in combination and adaptation of apparatus connected with the same, and for novel apparatus connected with the same. (A com.)

Dated 3rd January, 1861.

12. P. A. Moore, Penge, Surrey—Improved feet for levelling clocks and other articles.
13. C. Stevens, 1B, Welbeck-street, Cavendish-square—An Improved apparatus for stopping runaway horses. (A com.)
14. W. C. Fuller, 2, Bucklersbury, and J. A. Jaques and J. Fanshawe, Tottenham—Imp. in the adaptation of india-rubber and analagous gums, and compounds thereof, to valves, pump buckets, packing and other parts of steam, water, air, and gas engines and apparatus.
15. W. Heywood, Manchester—Imp. in machinery for grinding rollers and cylinders covered with card teeth.
17. A. V. Newton, 66, Chancery-lane—Imp. in the construction of air or gas engines. (A com.)

Dated 4th January, 1861.

21. J. Wright, 42, Bridge-street, Blackfriars—Imp. in machines for forming the heels of boots and shoes. (A com.)
23. W. H. Hore, Liverpool—Imp. in machinery or apparatus for measuring and registering the lengths of woollen, flax, cotton, and other fabrics applicable to registering lengths, distances, and revolutions generally.
25. A. Fairbairn, Leeds—An improved construction of forging press or hammer. (A com.)

Dated 5th January, 1861.

27. L. C. E. Vial, Paris—Imp. in the manufacture of colouring matters and pigments from coal oil, raw napthaline, and from the waste lime from gas works.
29. J. Watson, Glasgow, and C. F. Halle, Manchester—Imp. in spinning or twisting fibrous materials.
31. W. E. Gedge, 11, Wellington-street, Strand—Imp. in obtaining motive power. (A com.)
33. J. Sugden, J. Midgley, and W. Clapham, Keighley, Yorkshire—Imp. in the construction of covered rollers used in machinery for preparing and spinning fibrous materials.
35. J. Conlong, Belfast—Imp. in machines or engines employed for carding cotton, silk, flax, wool, and other fibrous substances.
37. J. I. Grylls, Murton-street, Sunderland—Imp. in anchors.

Inventions with Complete Specifications Filed.

69. B. B. Hawse, Vermont, U.S.—A new and useful or improved machine either for supporting clothes or other articles to be dried, or for other purposes.—10th January, 1861.
93. J. Gibbs, Brentford, Middlesex—Imp. in constructing submerged works.—12th January, 1861.

Patents Sealed.

[*From Gazette, January 18th*, 1861.]

January 18th.

1751. W. Barrett.
1757. C. W. Hahnel.
1759. J. Broad.
1763. H. W. Poulter.
1769. J. H. Young.
1771. S. Roberts.
1775. R. Hewens.
1777. J. B. J. Noirot.
1778. R. A. Brooman.
1784. A. Robertson & A. Ritchie.
1787. H. Hirsch.
1792. R. A. Rumble.
1797. M. R. Leverson.
1803. J. Pilkington.
1808. W. Rose.
1811. L. Kaberry.
1814. M. Henry.
1823. J. Renshaw.
1831. J. and G. Dakin.
1849. J. Nicholson.
1895. J. Higgins and T. S. Whitworth.
1922. C. F. Flounders.
1925. A. V. Newton.
1958. T. Greenwood.
1967. W. Field and E. Jeffreys.
1980. C. Green and W. Asbury.
2007. A. V. Newton.
2069. A. V. Newton.
2071. P. Effertz.
2110. W. E. Newton.
2111. J. G. Willans.
2143. W. E. Newton.
2344. T. Brookes and T. Adams.
2499. J. J. Russell and B. L. Brown.
2651. W. T. Vose.
2669. F. Johnson.
2682. W. Clark.
2771. H. E. West.
2865. D. Auld.
2869. E. Monkhouse.

[*From Gazette, January 22nd*, 1861.]

January 22nd.

1805. C. W. Lancaster.
1806. J. L. L. Cambacérès.
1809. R. T. Smith & T. Suckley.
1824. R. A. Brooman.
1825. S. Terrill.
1834. G. C. A. Marquis d'Auxy.
1842. S. A. Carpenter.
1848. H. Greaves.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, January 18th*, 1861.]

January 14th.

73. R. Archibald.
112. H. Smith.
119. J. Brown.

January 15th.

83. E. Wilson.
100. C. Rishworth.
102. J. J. Russell.

January 16th.

81. T. Hamilton and J. Hamilton.

[*From Gazette, January 22nd*, 1861.]

January 18th.

91. T. Pirie.
106. W. White.

January 19th.

116. P. Wilson, S. Northall, and T. James.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, January 22nd*, 1861.]

January 18th.

129. J. North.

January 19th.

129. R. A. Smith and A. McDougall.

Journal of the Society of Arts.

FRIDAY, FEBRUARY 1, 1861.

EXAMINATIONS.—LOCAL BOARDS.

Those Secretaries of Institutions who have not already forwarded Lists of their Local Educational Boards are requested to do so as soon as possible, not omitting to specify the Chairman and Secretary.

Copies of the Programme of Examinations for the present year may be obtained by members of any of these Boards on application to the Secretary of the Society of Arts. In this will be found full instructions for their guidance in making the necessary arrangements for co-operating with the Society of Arts.

EIGHTH ORDINARY MEETING.

Wednesday, January 30, 1861.

The Eighth Ordinary Meeting of the One Hundred and Seventh Session, was held on Wednesday, the 30th inst., W. H. Bodkin, Esq., Assistant Judge for Middlesex, Vice-President, in the chair.

The following gentlemen were proposed for election as members of the Society:—

Battam, John H.	Gough-square, E.C.
Cresswell, A. J. Baker	Cresswell, Morpeth.
Dixon, James W.	Cornish-place, Sheffield.
Hartley, Bartholomew H.	Red-hill-lodge, Red-hill, Surrey
Ledger, George	5, Caroline-street, Bedford-square, W.C.
Malcomson, William	Milfort, Portlaw, Ireland.
Murray, Andrew	2, Old Palace-yard, S.W.
Porter, John H.	Birmingham, and 10, Old Cannon-street, E.C.
Rogers, Rev. William	7, Charterhouse-square, E.C.
Toase, Thomas	Kingston, Jamaica.

The following candidates were balloted for and duly elected members of the Society:—

Aldridge, R. W.	The Avenue, Denmark-street, Camberwell, S.
Allen, Thomas	Upton-cottage, Macclesfield.
Beale, James	11, Wellington-place, Cork
Boden, Henry	Ednaston-lodge, near Derby.
Borries, Christian	Newcastle-on-Tyne.
Breillat, E.	Murdoch-villa, Coburg-road, Montpelier, Bristol.
Cammell, Charles	Norton-hall, near Sheffield.
Chesterfield, Earl of	3, Grosvenor-square, W., and Bretby-park, Burton-on-Trent.
Clayton, Thomas	South Stainley, Ripley, Yorks.
Cocker, Joseph R.	Belle-vue, Hathersage, *viâ* Sheffield.
Cooper, Major William Cooper	Toddington Manor, Dunstable, Beds.
Dickinson, Peter	Holland-house, Vassall-road, Brixton, S.
Euing, William	209, West George-street, Glasgow.
Hamilton, Edward Wm. Terrick	32, Upper Brook-street, W.
Harris, Henry	Heaton-hall, near Bradford.
Heaps, John Knowles	Leeds.
Henderson, John	Hungerford Wharf, Strand, W.C.
Higginbotham, Samuel	Glasgow.
Howard, Edward C.	Brinnington-hall, Stockport.
Hunt, Thomas	Bridge-street, Banbury.
Kay, John Robinson	Walmesley-house, Summerseal, near Manchester.
Lyons, M.	143, Suffolk-street, Birmingham.
Mitchell, C.	Low Walker, near Newcastle-on-Tyne.
Morrison, Robert	Ouseburn Engine Works, Newcastle-on-Tyne.
Muspratt, Frederic	Woodend Chemical Works, Runcorn Gap, Warrington.
Napier, Robert	West Shandon, Glasgow.
Neville, Samuel	Ellison Flint Glass Works, Gateshead-on-Tyne.
Oakes, John	Riddings-house, near Alfreton.
Pierpoint, Benjamin	St. Austin's, Warrington.
Platt, John	Oldham.
Radcliffe, John	Lower-house Mills, Oldham.
Richardson, E. Junr.	3, Lovaine-place, Newcastle-on-Tyne.
Robb, Alexander	79, St. Martin's-lane, W.C.
Smith, Samuel	6, Upper Westbourne-terrace, Hyde-park, W.
Sowerby, John	Ellison Flint Glass Works, Gateshead-on-Tyne.
Straker, John	Willington-house, Durham.
Turner, Robert	32, Grey-street, Newcastle-on-Tyne.
Wotherspoon, William	46, Dunlop-street, Glasgow.
Young, J. H.	64, Gordon-street, Glasgow.

The following Colonial Institution has been taken into Union since the last announcement:—

Corfu, Ionian Association for the Promotion of Science, Literature, and Art.

The Paper read was—

ON FOOD; ITS ADULTERATIONS, AND THE METHODS OF DETECTING THEM.

By Wentworth Lascelles Scott.

It is with no little diffidence that I have undertaken to address you this evening upon the subject of our food and drink—its various impurities and sophistications; a subject of such ample scope and grave importance, that I feel quite incapable of doing justice to it in the brief hour allotted for the reading of this paper. Nevertheless, important nationally and individually as the subject is, it has not hitherto received a commensurate amount of attention from scientific men, the commercial world, or the general public; indeed, at the present moment, the latter are accused of apathy and indifference in the matter—but the charge is a false one, as I shall presently endeavour to show.

The practice of adulterating articles of food and drink, as well as those myriad non-alimentary substances so necessary to our comfort in various ways, is by no means of recent origin, as, according to Pliny, the wines of his period were largely adulterated; lead, either in the metallic form, or in that of acetate, being added, to work off the sourness of new or inferior varieties; while, if I am not mistaken, our Saxon Harold greatly distrusted the confectionary department (as well as the holy relics) of Duke William's palace, when on his memorable but decidedly uncomfortable visit to that crafty potentate. A history of the "rise and progress" of adulteration, however, although it might be interesting to some, is quite removed from my present purpose, which has to deal

exclusively with the evil propensities of our own time and our native country.

Adulteration, in the more comprehensive sense of the word, may be stated to signify, 1st., the dilution of any articles for sale as genuine with other substances of inferior commercial value or less marked properties, as instanced in the addition of water to wine or spirits, or of chicory, &c., to coffee. 2ndly, the heightening or simulation of their active principles, by the admixture of various matters foreign to their legitimate composition, of which examples may be found in the falsification of bread with alum, gin with capsicums, &c. 3rdly, The employment of various colours, essences, &c., for the purpose of rendering the articles more attractive to the eye, or to the senses of taste and smell. In this division may be placed bottled fruits and pickles, rendered green by cupreous salts; various syrups and light beverages, coloured and flavoured to a dangerous degree, and, in fact, confectionary *in toto*. Lastly, any combination may be made of these several kinds of adulteration in the fabrication, or getting up for the market, of any of those cheap food-preparations, so terribly abundant in poorer neighbourhoods, and but too frequently met with in fashionable localities.

Adulteration, however, is not quite confined to the types I have just indicated, for if a manufacturer of any one of the almost countless "foods, drinks, condiments, or narcotics," with which we are acquainted has an accident in the process of that manufacture, or if his consignment of a certain ingredient is of a very inferior quality, does he put aside for other purposes the deteriorated article, or explain its deficiencies, and sell it at a lower price? No; in the vast majority of instances he proceeds in the manufacture of that article as usual, adding thereto various colouring or flavouring adulterations (which may be poisonous, injurious, or harmless, as chance disposes), to simulate the physical qualities it ought to possess, or conceal their absence by heightening the tint, pungency, &c.

Again, I ask, in how many cases will the retail tradesman confess that an article which has been exposed in his shop window for a month or two, to the influences of sun, dust, and atmosphere, is injured in appearance and properties? I have here an illustrative specimen — some "crystallised" sugar, containing about 3 or 4 per cent. of dust, sold to me as the "same quality" as that which attracted admiring observers to the window, by its superior lustre and whiteness. Clearly this is adulteration, should be recognised as such, and should be punished as such. But perhaps the most heartless and pernicious species of adulteration, is that shown when persons make it their rule to manufacture nothing else but inferior, adulterated, and deleterious articles, buying up all sorts of injured produce, and refuse matter, for the compounding of their "pure and nutritious" or "health-giving" foods, as their advertisements would say;—relying upon an ambiguous but highflown testimonial from "the late Dr. Blank," or some other celebrity of the same moral calibre, and also upon the tendency of a too confiding public to purchase "cheap" things, to get rid of their vile, perhaps poisonous, mixture at an immense profit.

It must be readily seen that an intelligible and practical classification of this complex subject is somewhat difficult. I have attempted, however, to embody in the form of tables (see Tables I. and II.) a kind of general outline of adulteration and its effects, which, if in the hands of the people at large, might possibly guard them from some few impositions.

Having now made up our minds that the cause of adulteration is simply that fraudulent tradesmen wish to acquire, in an indolent manner, more money than the honest man can obtain by years of toil and application, we have to consider, in the first place, by what methods we can discover and tangibly demonstrate the presence of adulterants of any kind in articles sold as genuine, and find out in what proportion they have been added. Secondly, what measures, social, scientific, or legislative, require to be taken for the suppression or diminution of this great and growing evil; and, lastly, what part in such measures this Society, known throughout the world by its beneficial influences upon all things tending to advance the knowledge or promote the welfare of our countrymen, seems to be called upon to perform.

The limits of my time to-night are, of course, far too narrow for me to enter upon a detailed account of the various analytical processes for the detection of food-adulterants known to modern chemists, or employed by myself, but, for the benefit of those persons (forming the greater portion of the public) who are unacquainted with any means of testing the purity of their food, and who are unprovided with the complicated and costly apparatus of the analyst's laboratory, I will briefly narrate what everyone might do, and, as I hold ought to do, with the various articles of his daily food and drink.

I will commence with what has been aptly and poetically denominated the "staff of life"—bread. Recent analytical experiences, however, show very forcibly that in most cases the "staff," as supplied in the form of "half-quarterns," is but a very frail reed indeed for a working-man to lean upon. Bread is adulterated with a variety of substances not legitimately entering into its composition—some harmless, some injurious to health, but none, to my knowledge, of an actively poisonous nature.* The general characters of pure bread are tolerably well-known to most people, and after Dr. Dauglish's able paper at this Society last session,† I should only be recapitulating were I to enumerate them. Of pure bread there are several specimens on the table, illustrating Dr. Dauglish's process, as carried out by Messrs. Peek and Frean, and the ordinary method, of which latter Mr. W. Salmon, of the King's-road, Chelsea, has furnished me with samples.

When bread is adulterated with other flours or starches the admixture is often somewhat difficult to detect without the aid of a good microscope, but some of the simpler and less expensive varieties of this valuable instrument will frequently answer the purpose. The presence of potatoes in bread imparts a peculiar crumbly texture, which a very casual inspection will enable us to recognise; while rice-flour causes a brittleness of structure not easy to mistake. Nitric acid affords a means of showing the presence of potato-starch when in large quantity, as it will give a colouration to wheat flour, while the other farina remains white. Maize or Indian corn flour may be detected (without a microscope), if a little care is taken, by roughly estimating the amount of fatty matter, as maize contains fully four times the quantity of fat that is usually found in wheat. The bread should be carefully and completely dried, powdered, weighed, and washed with (what is sold for) pure benzole or benzine, upon a filter, then dried perfectly and weighed again. The loss upon the former weighing will give the amount of fat or oil, extracted by the benzole.

Oatmeal also contains a comparatively large quantity of fat, but is seldom, if ever, used as an adulterant for bread or flour in this country. No instance has come under my own observation.

Chalk, or carbonate of lime, is shown to be present if the suspected bread effervesces strongly on the addition of an acid. If gypsum, or plaster of Paris, be looked for, boil the bread in water‡ for a long time, till quite broken up and partly dissolved; then, after standing, pour off; wash the sediment (if any), and boil the latter in a solution of pure carbonate of soda; filter, or pour off the clear liquid, to which add some chloride of barium; if this gives a decided milkiness, and the washed sediment an effervescence with acids, the bread has been adulterated with plaster of Paris—a substance of great importance to

* Sulphate of copper (*bluestone*) is used by Belgian and Austrian bakers, but not in this country.

† See *Journal*, Vol. viii., p. 414.

‡ The water should be distilled.

fraudulent tradesmen, who use it extensively in the manufacture of confectionary (when it goes under the name of "daft"), mustard, and many other articles.

I now come to speak of a substance—concerning which there has been a great deal of discussion in this room and elsewhere, both as to the best methods of detecting it, and also on the question of its presence being hurtful or the reverse—I refer to alum. This is about the most frequent adulterant of bread, very few samples being uncontaminated by this salt. I may here mention, as an act of simple justice, that the sample of fermented bread before you on the table, is from the shop of Mr. Salmon, who is almost the only baker in the district of Chelsea, so far as my knowledge extends, who sells perfectly pure and unadulterated bread. This may be considered a bold assertion, but it is my well-founded opinion, nevertheless.

Alum, when present in pretty considerable quantity, may be detected by soaking the bread in water for some time and adding a salt of barium to the clear extract, when a cloudiness, more or less marked, will occur, an experiment I think I may be able to show you. Another way is to char the bread, and burn it nearly to an ash, and boil the latter with diluted hydrochloric acid, to which a little nitric acid has been added; the addition of ammonia to the filtered liquid will precipitate various substances, including the alumina of the alum. This precipitate must then be boiled in potassa, when, after filtration, the liquid must be neutralised with hydrochloric acid, and the alumina may then be thrown down by ammonia.

Bone-dust is now but seldom found in bread; it may be detected very readily with the microscope. The preceding observations apply of course equally well to flour, which is very largely adulterated with inferior varieties of wheat and other meals in addition to alum and the adulterations before mentioned. My experiences show that on an average the bread in London is more or less adulterated to the amount of 87 per cent.—by which I mean to say that if I were to buy 100 loaves, at as many different bakers in various parts of the metropolis, I should get about 13 of good and genuine bread. At this present time I should probably not get quite so many good loaves, as the late bad harvest has thrown large quantities of damaged corn on the market, which of course is adulterated proportionately.

The adulteration of cakes, biscuits, and similar articles are chiefly those of the several ingredients composing the same with but few special additions. Saffron, gamboge, chrome yellow, &c., are, however, frequently used in the manufacture of sponge cakes and bath buns, for the purpose of deluding the unfortunate school-boy whose weakness lies in that direction into the belief that no expense has been spared in the matter of eggs; gastric, and probably another kind of irritation often follows the experiment. Messrs. Huntley and Palmer have favoured me with some specimens of the various biscuits made by them, as regards which they say, "it is impossible to select the articles of our manufactures of better quality or of greater purity"—an assertion my own extended observations have fully borne out. I may also direct your attention to the pure biscuits of Messrs. Peek and Frean, to those of Messrs. Hill and Jones, and to some intended for the nursery made by Mr. Salmon. Samples of all these are on the table.

Corn is subject to a variety of diseases, which often greatly impair its quality, and even render it dangerous as food; of these perhaps the *ergot fungus* and the pepper-brand (*uredo fœtida*) are the most disgusting in their effects, the former acting sometimes like an irritant poison, and the latter is said to have occasioned skin diseases. Corn or meal affected with the smut or pepper-brand is at once distinguished by the disagreeable odour it emits and thus may be bought up cheaply, which to my personal knowledge is often done for the purpose of making cheap, highly-flavoured cakes and puddings with the flour, which is also used for adulterating mustard, pepper, ginger, and other articles having a powerful odour of their own, which conceals that emanating from the uredo fungus. Another variety of uredo (the *uredo segetum*) is known to growers by the name of *dust-brand*, *black-burn*, or *smut*, but though injurious and destructive to growing crops, it does not appear to deteriorate the flour to any very great extent. I have, however, noticed a deficiency of nitrogen in wheat affected by smut. Various insects, too, such as the *musca pumilionis*, *cecidomyia tritici*, &c., attack and injure corn. I may not, however, dilate upon them now, but will refer those interested in the subject to the able papers of Mr. E. Quekett and Professor Henslow. An inquiry into the causes of the cereal fungi and the means of preventing their occurrence, would be one of great scientific interest and practical value, and in my opinion would be accomplished without great difficulty, if this Society were to offer a prize for the research. While on the subject of corn, I may mention a notable instance of its adulteration, which came under my notice at Wakefield some few years back. A gentleman purchased a quantity of wheat grain at the market there, at a rather lower rate than ordinary, for the apparent quality. After-examination showed that the bulk of the sacks were filled in with shrivelled or diseased wheat and barley, the uppermost 12 or 14 inches being grain of fair quality. Certain circumstances which I need not relate, rendered redress impossible.

Barley and oatmeal are frequently adulterated with inferior samples of either, and our poor horses frequently get some five and twenty per cent. of brewers or distillers "grains" served out to them in their reputed measure of oats.*

Peas, beans, lentils, and other *leguminosæ*, all come in for a share of adulteration; albeit, they are used largely as adulterants themselves. I may here remark that, in the examination of all cereal and pulse flours, starches, prepared farinas, &c., I have found that the previous abstraction of the oil or fat, by means of benzole, greatly assists the investigation, especially for the microscope, where very slight differences of the form and structure of starch granules have to be observed. Generally speaking, the too liberal use of alcohol or ether, as recommended in many works, should be avoided, for those liquids will occasionally produce a slight alteration in some of the granules, by cracking or wrinkling the outer membrane, and, by making them appear more like other starches, render their true origin doubtful. I am, perhaps, a little prolix on this point, as I believe that the errors now and then said to be made by microscopists may be due to this cause. The starches afforded by various plants all differ in size, form, or character of surface when viewed under a good microscope, and may be thus distinguished from one another. Into these literally microscopic details we may not enter now, but I have arranged a series of the more important starches, which Mr. Baker's very excellent microscopes will enable you to compare. Unforeseen circumstances have prevented my appending to this paper some notes on the microscopy of starches, and a table of their micrometric measurements, which, however, may hereafter appear in the *Journal*, should the Council deem them worthy to be printed.

Arrowroot is a farina or starch of remarkable purity—that is, the genuine "Maranta" variety; but out of 100 samples bought promiscuously in London, about 48 only would be genuine, and all those even would not prove of first-rate quality, as many of the samples imported are contaminated with albuminous and ligneous matter, from having been carelessly prepared. The adulterants are, as might naturally be supposed, various other starches and farinas, those most in vogue being potato and wheat starches, and sago meal. It has been said, and generally with truth, that the adulteration of arrowroot is of comparatively little consequence since none of the adulterants are detrimental to health, and they all answer the intended purpose nearly as well as the genuine article; but I have

* The *rape cake* given to horses and cows often contains a quantity of refuse mustard seed, which always proves dangerous, and sometimes fatal, to the former animal.

had a sample of "genuine Maranta arrowroot" containing a large quantity of barley starch of a bad colour, and a notable amount of *flake-white*—a carbonate of lead, and a substance not calculated to preserve one's health or invigorate the system.

Maranta arrowroot gives an opaque paste when mixed with about twice its volume of strong hydrochloric acid, while potato-starch, under similar circumstances, yields a translucent jelly.

There are various other arrowroots known to trade, such as "East India arrowroot," derived from the tubers of *Curcuma angustifolia*, that from Tahiti (from the *Tacca oceanica*); "Brazilian arrowroot" (the farina of the *Manihot utilissima*), and many others. They are not often to be bought pure at retail shops.

I must necessarily pass over a number of mixed or "prepared" farinas with high-sounding titles, and, if we are to believe the packet-labels, superlative powers of restoring health, happiness, and peace of mind, in cases "where many eminent physicians had failed to effect a cure;" they are, without exception, frauds of the worst description, and the selling of such articles should be distinctly known to the public as, in fact equivalent to, the grave offence of "obtaining money under false pretences." On this section of the subject, Dr. Hassall and the editor of the *Lancet* have done good service by exposing many of these wretched impostors.

More recently, however, various manufacturers, importers, and others, have evinced a laudable desire to supply the public with pure food, and these I hold ought to receive every encouragement, as they frequently labour under very great difficulties from the opposition against which they have to contend. To cite an instance, I will point to Brown and Polson's Patent Corn-flour—an article of which I have a very high opinion, as it professes to be nothing but what it is — the fecula of maize, very carefully prepared. Specimens of this starch, or flour, are on the table, and also of the gluten and husk, which, when mixed, form an excellent occasional food for horses, cattle, &c.

Even this prepared flour, however, apparently protected by the signature and trade-mark of the manufacturers, is sometimes adulterated. I met with an instance at Islington, where, with the "trade mark" slightly altered, some potato starch and barley flour, with but little of the maize, was sold to me for "Brown and Polson's patent farina." I am inclined to think that in this instance the "corn flour" was used to adulterate arrowroot, while the packets were refilled with the above mixture.

Passing from bread and farinas, we naturally come to meat, as the next staple component of our daily food. Here, again, we have ample scope for detective examination and remedial legislation, for not only is a great deal of that commonly sold not of the quality it should be, but of the meat disposed of at the London markets, nearly ten per cent. is more or less unfit for human consumption. It is well-known that butchers will adopt any means of making their meat appear better and fresher than it really is, and accordingly we not unfrequently find that washes of vinegar and water are used to heighten the colour of some meats; weak alkaline leys to improve the appearance of others; and, when decomposition or disease renders more potent agents necessary, even arsenical solutions are employed without hesitation. With game and poultry this latter practice is, indeed, quite common, and I call upon you to-night, as a small but influential portion of the British public, to express unmistakeably your opinion of such practices, and to do all in your power to suppress them.

Vegetables and fruits here follow most appropriately—their adulterations and deteriorations must be known to you all, and also the methods of detecting the same, but I may perhaps name a few points without being accused of tediousness.

The question has often been put to me—can fruit ever be adulterated? As often, my answer has been in the affirmative. Without going into what might be called the natural and accidental adulterations—such as blight, mildew, insects, &c., I may mention that I have seen English apples, of rather inferior quality than otherwise, coloured superficially in imitation of the American Newtown Pippins, and sold as such at the rate of two and three shillings per dozen! Although we may admire the artistic genius thus displayed, we must still condemn the fraud. Old and inferior oranges, well boiled, with a little saffron added to assist nature when her shortcomings in the matter of external colouring are a little too obvious, may be purchased at many shops, as we all know Melons and cucumbers, too, when looking pale and dejected from waiting so long to be eaten, have their rusty coats furbished up with a little acetate of copper, so that a "green old age" at least is accorded to them.

The mention of verdigris reminds us to turn to pickles, sauces, condiments, and other similar contrivances for manufacturing appetites for debilitated humanity. Here the field is so wide, as regards adulterants of all kinds and species, that a hasty glance at them is all we can afford to give.

Before considering the special adulterations of pickles, it will be well to note those practised with the several articles used in their manufacture. We will commence with vinegar, which is largely sophisticated with water and crude acetic acid,* sulphuric acid, or oil of vitriol, together with burnt sugar, and other materials for colouring. The strength of vinegar (*i.e.*, the per centage of acetic acid therein) can only be accurately estimated by employing an alkalimeter, and discovering by such means how many grains of dry carbonate of soda are required to neutralise a given measure of the vinegar. A more simple, but less exact, method is to weigh carefully a small, dry, white lump of Carrara marble, and to place the same in a known weight or measure of the vinegar† until effervescence has entirely ceased. Then the marble may be rinsed, dried, and re-weighed, when a loss of five grains upon its original weight would show the presence of six grains of monohydrated acetic acid in the measure of vinegar taken for the experiment. The vinegar of commerce may be divided into two classes—fermented and distilled vinegar; the former derived from either sugar, malt, or wine, the latter obtained by the distillation of wood. According to the researches of Dr. Hassall, the per centage of acetic acid in ordinary vinegar varies from 2·38 to 5·66 per cent., a disparity sufficiently large to show how greatly standard strengths are required resembling those employed in determining the value of spirits. Very weak vinegars should always be discarded, as they are unable to prevent the decomposition of meat and vegetables, while the extremely pungent varieties are immediately open to suspicions of cayenne pepper and sulphuric acid. The latter is very readily detected by the addition of a barium salt, which throws down a white insoluble precipitate if the acid is present. Now, vinegar may often contain a small quantity of combined sulphuric acid, derived from the water with which it is made and diluted, and $\frac{1}{1000}$th part of pure acid is permitted to be added by law, although there is never any real occasion for this, as, if the vinegar itself is good, it will keep for any time. On this account vinegar will generally give a milkiness with chloride (or nitrate) of barium, but of course not to such an extent as when oil of vitrol is distinctly added as an adulteration. I have myself found as much as 7·4 grains of sulphuric acid in 1,000 of vinegar, I have also once detected oxalic, and in another sample formic acid (evidently having been purposely added),—facts which I believe have not been noticed heretofore. The onions and cauliflowers in pickles are generally slightly tinted with turmeric, but as this colouring matter is itself frequently adulterated with the poisonous chromate of lead, its employment is often

* Derived from the destructive distillation of wood.

† After the sulphuric acid present (if any) has been separated by the addition of a little chloride of barium.

raught with danger to the consumer. On the other hand, with the cucumbers, girkins, and French beans, the custom is to render them considerably greener than they ever were by nature, by the addition of salts of copper. This may be accomplished in several ways—either by directly adding verdigris, oxide of copper, or sulphate of copper, ("bluestone") to the pickle, or by leaving the vinegar in copper pans for some time so as to dissolve a portion of the metal. In relation to pickles, I must say that consumers are open to very great blame, for the too general rule with them is to buy those pickles which are of the deepest green, for no better reason, it would appear, than that they are considered prettier. It is quite time all such weaknesses were dissipated, and I hold that he who chooses to buy girkins where he can get them greenest is of the same intellectual tint personally, and, whenever he purchases a pickle, deserves also to get into one. For various specimens, and much valuable information on this subject, I am indebted to Messrs. Crosse and Blackwell, who certainly evince a great desire to deal fairly with the public —if the public will only allow them to do so, and not persist in asking for green pickles, bright yellow mustard, and intensely red cayenne pepper; I can conscientiously affirm that these dangerous articles cannot now be purchased in Soho-square.

I have here a bottle of pure pickles, and here an adulterated sample; the difference in tint, you see, is very apparent, and if I add to both a little solution of ammonia, the presence of a large quantity of copper in the one case, and its entire absence in the other, will be speedily shown. The properties of dissolved copper, as an active poison and powerful irritant, are very generally known; it is a great pity that people will not think of them a little oftener than they do. According to my calculation, about 91 per cent. of the pickles sold in London are more or less adulterated, and in Liverpool the proportion is often greater still.

I have now to exhibit what might justly be considered a very great curiosity—one, too, which it is probable that not many of those present have ever seen before—I refer to this specimen of genuine mustard, kindly procured by a friend, specially for me. Even this, however, is not absolutely pure, for the microscope detects traces of wheat-flour in the sample—looking rather as if the mill which ground it had indulged in bad habits so long that they could never be entirely eradicated. The chief adulterants of mustard are:—Plaster of Paris, chalk, clay, quick-lime, various flours and starches, cayenne and other peppers, annatto, turmeric, gamboge, and chromate of lead, all of which come in also for making "ground ginger." I once bought a sample of mustard so largely adulterated with *fresh* plaster of Paris, that when mixed with water it "set" into a solid cake in the course of a few minutes.

I will mix a little of my genuine sample here and also some bought in a packet, which I know to be adulterated with flour and other matters. You will observe that the addition of ammonia causes no change in the good sample, while the adulterated is altered in colour to a reddish brown, thus proving the presence of turmeric. Ginger is falsified so much in the same manner that I need not again refer to it. Ginger is seldom to be met with pure, mustard *never*. The microscope furnishes the only reliable method of testing for flours and starches, in ground spices and condiments.

Turmeric is a usual and legitimate component of currie powder, which I am told cannot be made without it—a broad assertion I am greatly inclined to doubt. It is greatly falsified with various injurious and poisonous yellow colours, and as currie may contain almost every conceivable abomination, under cover of "peculiarity of the original receipt," I do not see how its adulteration can be prevented unless by the adoption of standard recipes. The specimen of currie powder on the table is quite free from all injurious admixture.

The adulterations of pepper present a few points of interest, so they must not pass quite unnoticed, for in addition to the usual flours, meals, &c., we find lamp-black, black-lead, coal ashes, and even road dust in some samples. In New Orleans, Philadelphia, Liverpool, and occasionally in this metropolis, a "pepper" is sold consisting of old ships or dogs' biscuits (such as those upon the table, but in a considerably worse condition); first soaked in an infusion of capsicums, then dried and ground finely with a little lime, and any other little additions in the way of colouring matter that might be required. This would be "nice and strong"—anyhow, "almost too genuine," as I have heard some people say in their innocence, when commenting upon a sample more than usually adulterated.

Mace and nutmegs are chiefly adulterated with damaged and inferior specimens, and occasionally a portion of the aromatic oil is extracted before they are sold, thus diminishing their intrinsic value. According to Chevallier,* nutmegs are frequently adulterated with worm-eaten varieties, the apertures being filled up with a paste made of nutmeg powder, flour and oil; the same composition is used to form imitation nutmegs. In the United States wooden nutmegs are now and then sold along with the purchaser.

Somewhat similar remarks will apply to cinnamon, cloves, cassia, and pimento; the first, however, is, I believe, imitated, but inferior and spent varieties of all are used as adulterants. Microscopical examination shows when the samples have been previously boiled, as the granules are then much altered in appearance and augmented in size. With ground spices, of course, adulteration flourishes vigorously to an average of about 60 per cent. in the larger towns of Britain, and a still higher figure in country villages.

For an illustrative collection of genuine spices, I am beholden to Messrs. Travers and Sons, of St. Swithin's-lane; the specimens are now before you: I have here a pure sample of cayenne pepper, and also one adulterated with, among other things, red-lead; by sprinkling some of each upon the surface of some water they are readily distinguished, as the mineral poison will sink to the bottom whenever it is present.

The preservation of food-substances is a subject of no little importance, upon which a dozen papers might be written without fear of exhausting it; I can therefore only select a point or two here and there, for discussion to-night. Preserved fruits and vegetables are greatly sophisticated, a fact the more to be regretted, because it is evident the guilty parties must be the original manufacturers—not the retail tradesmen. A glance at the tables accompanying this paper will best convey information on this section; the observations concerning green pickles may be wholly applied to green preserves. Various colouring matters are employed in preparing the other varieties, but these are seldom of a deleterious nature, as body-colours are quite inadmissible. Gamboge, however, is a favourite addition for inferior marmalades; it requires to be carefully distinguished from turmeric, which it somewhat resembles; in testing for either colouring matter in preserves, strong alcohol should be used as the solvent.

Specimens of various bottled fruits, of Messrs. Crosse and Blackwell's manufacture, are on the table; they are prepared by a process as simple as it is efficient; the carefully-picked fruit, with the addition of a small quantity of water, is introduced into wide-mouthed bottles, which are placed up to their necks in large cisterns, or water-baths, heated to a temperature of 200 degrees, where they remain for about twenty-four hours; they are then taken out and stowed away in cellars until required. Some kinds of vegetables, such as green peas, are treated in a similar manner, cylindrical tin cases being substituted for bottles. I learn from an inspection of the works of the firm in question that no less than 9,370 tins of green peas were sealed at their works in 1860, while of the fruits 51,000 dozen

* Dictionnaires des Altérations et Falsifications des Substances Alimentaires.

bottles, and of preserves, or, as they are more popularly called, jams, nearly 250 tons were prepared within the same year. I merely mention these statistics to show that if I describe any process or practice of Messrs. Crosse and Blackwell, I quote from no mean authority.

A point here occurs to me that is, I consider, too important to omit. There are a great number of varieties of tropical and other fruits which are seldom seen in this country, owing to the very great difficulty of transporting them safely; if, however they were carefully suspended in metallic cases of peculiar construction, provided either with small tubes containing phosphorus or an alkaline solution of pyrogallic acid, or else with fragments of charcoal soaked in chloroform, I am fully convinced that the form, colour, and flavour of the banana, mango, mangosteen, alligator pear, plantain, and many other luscious and delicious fruits, might be known in this country, almost as perfectly as in their own.

Fruit and wine essences and syrups next claim our attention; in this department, a variety of sophistications are apparent, as the result of careless manipulation, the use of impure sugars and of a host of injurious colouring matters, or flavoring principles. Thus the liquid generally known as fusel-oil has a colour and flavour of a very disagreeable kind, and in many cases, acts injuriously on the animal economy* but treated with various chemical reagents, it at once becomes the source of several fruit ethers or flowering essences. Treated with bichromate of potassa and sulphuric acid, it yields by distilling the mixture, a volatile fluid, the *valerianate of amyle*, which is employed by confectioners as an essence of apples. The *acetate of amyle*, better known as essence of jargonelle pears, is the result of the distillation of fusel oil with acetate of potassa and sulphuric acid. Melon-essence (*coccinate of ethyle*) is also artificially prepared from ordinary, or wine ethers; cocoanut-oil, the essence of quinces (*pelargonic ether*) by distilling together oil of rue and nitric acid, and that of pine-apples (*butyrate of ethyle*) by saponifying butter and distilling the resulting soap with sulphuric acid and alcohol. Benzole, too, under the influence of concentrated nitric acid, yields a very good imitation, in point of flavour, of essence of almonds, and, accordingly, is largely employed for the purpose. All these artificial essences, and a great many others, would probably effect their intended object much better than the natural ones, if due care were exercised in their preparation, which, unfortunately, is not very often the case; we are, as yet, greatly in the dark upon the subject, which presents a wide field for future investigation. Many of the compound ethers, I believe to be injurious to health, even in small quantities; fusel oil, for instance, a very common impurity in essences, wines, and spirits, seems to have a powerfully narcotic effect upon some people, producing headache, nausea, and a tendency to vomit; while with others it is apparently harmless.

Sugar shall be our next article of food—a rather prominent one, if we consider the quantity annually consumed in the United Kingdom, which, in 1859, amounted to no less than 8,641,927 cwt. of the raw variety (or about 32¼ lbs. per head of the population); and of refined sugar and sugar candy, 242,379 cwt., or, between 13 and 14 oz. per head.

Raw, moist, or brown sugar, as imported, is much contaminated with dust, fragments of cane, molasses, and some minute insects of the *acari* genus—the *acarus sacchari* of Hassall, to whom the honour of their first discovery is due. Retail grocers, however, add to their sugars, for purposes of adulteration, inferior kinds — fine sand, sawdust, salt, water, flour, potato, and other starches. The best way of examining a sample of brown sugar is in my opinion to determine, in the first place, the per centage of moisture, by carefully drying, at a temperature not exceeding 120 deg., a known weight of the sugar; the loss sustained will give the water contained in the same. The dried powder should then be placed upon a filter, and washed with cold distilled water until the washings are no longer perceptibly sweet, when the albuminous matters, if present, may be precipitated by boiling the solution.*

The insoluble matter, together with the filter, may now be dried and weighed, after which the starch granules, if any be present, can be recognised under the microscope with great facility; also *acari* and sporules of *fungi*, when they occur. Crystallised sugar is a much more wholesome, and also economical variety, especially that made by the centrifugal process, as it is nearly always tolerably free from imported impurities. It is, however, constantly adulterated with the inferior kinds, so that purchasers should be particular in their selection. Loaf sugar may contain a few of the ordinary impurities, if not carefully and thoroughly refined; also traces of pipe-clay, albumen, &c. Broken lump sugar has been adulterated with fragments of white marble, but this is, of course, quite exceptional.

It is greatly to be regretted that the sale of the impure brown sugars of commerce should be permitted at all, as the amount of injury their use inflicts upon the public health can be by no means slight. I hold, therefore, that remedial measures are urgently needed here. The common practice of selecting the very coarsest and darkest-coloured sugars (popularly known as *foots*) for the preparation of cakes, puddings, &c., is one which I cannot too strongly reprehend; if it be required to "make a cake look rich"—the usual pretext—why not employ a pure white sugar for the purpose of sweetening, and supply the place of the deficient dirt and colouring matter by a little wholesome burnt sugar, which will answer a great deal better. As to the finance part of the question—a delicate point with housekeepers—it will always be found cheaper to employ a fine white, or at least a light-coloured sugar, than to use a dark brown variety of a lower price.

The uses of sugar as a preservative agent are well known, and in the department of confectionary proper it holds the first place. Unluckily we insist upon having our bon-bons and conserves made, not only to please the palate, but also to attract the eye; thus has been called into existence the most universal and pernicious system of adulteration with which we are acquainted. It is easy to understand that in this department very large profits are to be made, if, as a rule, as much China clay, plaster of Paris, and flour, as possible are added to the various saccharine abominations manufactured, which are then ornamented with a variety of poisonous colours, and flavoured with some crude essence, to conceal more effectually their intrinsic inferiority. We will take the simple diluent adulterants first; the readiest methods of testing for these have already been given when speaking of the adulterations of bread, and therefore need not be repeated here. In all cases the suspected *bon-bon*, sugar-plum, or other article, should be immersed for some time in distilled water, when the insoluble matter is then presented in a convenient form for examination. In some instances it may be found desirable to burn away all the organic matters, thus leaving the ash alone for analysis. Next, proceeding to the colouring ingredients, it should be carefully noted whether these are soluble or not in the water, alcohol, or ether; if only one tint is apparent the entire substance of the article may be taken for experiment, if several they must be carefully separated by means of a small sharp knife. In the second Table accompanying this paper I have condensed some general information relating to the chief colouring matters used for purposes of (what might be called) ornamental adulteration, amounting to upwards of sixty in number, of which twelve or thirteen are active and powerful poisons —a like number are harmless, except in special cases of disease or morbid debility—while the remainder are either

* The real properties of fusel oil, or "*potato-spirit*" in this respect are as yet but very imperfectly known.

* These may, of course, be dried, and the weight ascertained if desirable.

more or less injurious to health, or we know too little about their effects upon the animal economy to venture a decided opinion either way. I beg here to record that my friend Dr. Benjamin W. Richardson has kindly brought his large experience to my assistance in this section of the subject, and that to him my best thanks are due, and are most gratefully proffered. Some pure confectionary of Messrs. Hill and Jones's manufacture is on the table before you.

It would absorb too much of our time to-night to narrate at length the method of testing for each colour, so — with some reluctance — I dismiss those points in a very few words. If a colour be soluble in water, it is far less likely to be an injurious mineral pigment than if it remain undissolved; it should be remembered, too, that alkalies will deepen into purples, most of the animal and vegetable red colours, while acids will heighten them, and increase their brilliancy. Indigo may be recognised by mixing it with plaster of Paris, drying the cake thus formed, and cautiously heating the same in a glass tube until the indigo (if present) sublimes in minute crystals. Blue litmus is changed to red by addition of an acid, ammonia or any alkali restoring the original tint; by this latter addition the colour of Prussian blue is destroyed. The greens derived from copper or arsenic are readily detected by the various well-known tests for these metals, while the red and yellow lead colours are quickly identified by their deportment with sulphide of ammonium, which turns them black. Specimens of coloured confectionary are so familiar to the eye of almost every person, that I have considered it unnecessary to exhibit many to-night—shop-windows furnish examples without number daily.

Reverting for a time to the animal kingdom, we have there still four articles which claim our attention, viz., milk, butter, cheese, and lard. The two first are rarely to be met with pure in this metropolis, for the simple reason that they are very easily adulterated.

Water is the usual adulterant of milk, as the dairyman who has only 40 gallons of pure milk at his disposal, while he requires 50 or 60, finds the "cow with the iron tail" ever ready to aid him in making up the deficiency. I have myself found the quantity of extraneous water in London milk to vary from about 8 to 61 per cent, while out of 100 promiscuous samples, from all parts of this city, I believe the number, more or less adulterated, in one way or another, would be about 74. Large additions of water not only impart a bluish tint to milk, but also decrease its specific gravity; some yellow colouring matter is therefore added, generally annatto, turmeric, or gamboge; and the liquid may be thickened with various starches, mucilage, or rarely with the brains of some animal. This latter is best detected by the microscope. Starch is shown to be present if the milk after separating the curd give a blue colour with tincture of iodine. Improper feeding and housing of the cows, too, are fruitful sources of bad milk, which when derived from diseased animals, certainly is injurious. Caution must always be exercised in determining the density of milk, as cream will diminish this very powerfully. The lactoscope of M. Donné is useful in determining the richness of milk, but a simpler, and perhaps a better instrument, was described some time since in the *Dublin Medical Press*, consisting of a thin hollow wedge of glass, graduated on one side, into which milk can be introduced, and its opacity discovered by ascertaining at what thickness of the wedge the graduations can no longer be seen through. The instrument has also been described in the *Chemical News*.

Butter, too, is one of those articles which affords a striking proof of the extent to which adulteration is carried in this country, both the "salt" and "fresh" varieties being sophisticated very largely. According to Hassall, the amount of water in the fresh butters examined by the "Lancet Analytical Commission," varied from 4·18 to 15·43 per cent., while the quantity of salt averaged from 0·30 to 2.91 per cent. In the salt butters, the extremes of water were 8·48 and 28·60 per cent., and those of salt, 1·53 to 8·24 per cent. My own more recent results show a wider difference, and I have found as much as 49 per cent. of water in some samples of salt butter. From a little pamphlet on adulteration, by Mr. John Postgate, of Birmingham, I learn that, in 1857, butter was sold in Liverpool to the poor, which contained only 48 per cent of that article, 24 pounds of a mucilage (probably a kind of lichen), and 28lbs. of water making up the remainder of this delightful compound. Butter is also adulterated with flour and other substances, and one instance has come under my notice in which the silicate of soda, or soluble glass, was the adulterant employed. Butter should be examined by melting a weighed quantity, in a graduated tube or jar, when the relative proportions of fatty matter and water can be roughly estimated.

Lard is adulterated in much the same manner as butter, and is itself sometimes used as an adulterant of butter.

Cheese is not generally adulterated, although instances have come to my knowledge. Some very fine samples of this article, and also of butter, have been kindly contributed by Mr. Osborne, of Ludgate-hill. I recommend these specimens to your notice.

Infused beverages must be our next consideration, commencing with tea as the most important. Here, I feel that I am treading upon rather delicate ground; after the able paper read in this room last week by Mr. Leonard Wray, it would be presumption in me to say very much upon the subject. I have to thank Messrs. Phillips for a small but interesting collection of genuine teas—I mean genuine as imported, for of the 21 samples here exhibited, from India, China, Java, and Japan, three have been coloured at Canton. Specimens of the Assam Tea Company's importations are also exhibited here. Some of these specimens are very fine, as may be readily perceived, and I am indebted to Messrs. Phillips no less for their kindly-accorded information on many points than for the standard samples now presented to your notice. That tea is very largely adulterated in the Chinese ports before shipment, and during the first preparation of the leaves also, I think the evidence is very convincing, but as to the proportional amount of adulterated tea imported into this country, we have little or no data to go upon. Taking the average of the black teas sold retail in London, I believe that out of 100 samples about 61 would be found more or less impure or adulterated, while of green teas the per centage of adulterated samples would be approximately 78. Teas are adulterated with a variety of substances, but the list is too long to enumerate. A good way of examining teas is to sift them over a white, smooth sheet of paper, when the colours, or "facing" will be presented in a convenient form for analysis. When burnt, tea should leave a white ash—a coloured one indicating mineral adulteration. To detect the presence of other leaves in tea, hot water should be poured upon a small portion, and the unfolded leaves can then be inspected under a small lens, and compared with standard specimens of teas, and the leaves of other plants. Here again, however, the microscope presents the only accurate method of determining the true nature of broken leaves. Diagram 1 is a rough outline representation of the leaf of the ordinary variety of tea (*Thea viridis*); No. 2 being the kind grown in Assam, or, perhaps, more properly Assam. Paraguay tea is shown in the next diagram (No. 3); and the leaf of coffee-plant, used in Sumatra and elsewhere as a substitute for tea, and sometimes imported into this country as an adulterant, is sketched in diagram No. 4. The leaf of the *Gaultherio procumbens** (figured in diagram No. 5) is employed in North America as an infused tea; it it is there called Mountain Tea. In this country I have once detected it as an adulterant. For the actual leaf specimens from which these diagrams were drawn, I am indebted to Mr. J. de C. Sowerby, of the Royal Botanic Society. Some

* The plant from which "*oil of winter-green*" is obtained.

TABLE II.

Showing the Chief Colouring Matters of Commerce used as Adulterants (Class IV. and V.), and their Effects upon the Animal Economy.

TINT PRODUCED.	ORD. NAME.	COLORING PRINCIPLE.	PREPARED FROM	WHENCE OBTAINED.	USED IN ADULTERATING	EFFECTS UPON THE ANIMAL ECONOMY.	REMARKS.
WHITE ...	Chinese White.	Hyd. Oxide of Zinc.	Nat. Minerals, Calamine, &c.	(*See Flake White.*)	Confectionary, tea, etc.	Not definitely known. Insoluble and probably inert.	
	Constant "	Sulphate of Barium.	Native Minerals, Heavy-spar, Witherite, &c.	Scotland, Derbyshire, &c.	" "		
	Flake "	Hydrated Oxide and Carbonate of Lead.	Metallic Lead, by various processes.	Derbyshire, Northumberland, Cornwall, Devon.	" "	Poisonous, Gastric irritation. Colic. Muscular paralysis.	
PURPLE ...	Aniline Purple: Mauve.	Aniline Purple.	Aniline, by oxidation, &c.	... ...	" Jellies, gelatine.	Indifferently known.	
	" Blue: Violetta.	Aniline Blue.	" " "	... ...	" " "	" "	
BLUE	Antwerp Blue. (*a*)	(*See Prussian Blue.*)	Prussian Blue and various Whites.	(*See Prussian Blue.*)	" Tea.	(*See Prussian Blue.*)	(*a*) Made by diluting Prussian Blue with chalk or other whites.
	Indigo.	Indigo.	Leaves of *Indigofera* (various species).	India, China, West Indies.	" " Gelatine.	Indifferently known. In large doses causes vomiting, in some occasions spasms. Is sometimes found in fluid excretions.	
	Litmus (*b*).	Various coloured acids.	*Roccella tinctoria* and other lichens.	Canaries, Cape Verd I., Levant, &c.	"	Inert.	(*b*) Sometimes adulterated with Arsenic and Mercury.
	Prussian Blue.	Ferrocyanide of Iron (*c*).	Horn, Bone, &c., by roasting with alks. and iron filings.	... ...	" Tea.	Not poisonous, but should be used only in small quantities.	(*c*) Chemical composition somewhat doubtful.
	Smalt.	Silicates (and Phosphates) of Cobalt.	Zaffre and other ores, by calcination with sand, &c.	Norway, Germany, Holland.	" "	Indifferently known. Mechanical irritant.	
	Ultramarine.	Lazulite.	Native Mineral by calcination, &c., and artificially.	China, Thibet, Badakschan.	"	Indifferently known. Mechanical irritant.	
	Verditer.	Carbonate of Copper.	Soluble Copper Salts, by precipitation.	Usual sources of Copper ores.	" Tea, pickles.	Poisonous. In small doses, a gastric irritant.	
	Woad.	... ...	Leaves of *Isatis tinctoria.*	Various parts of Europe.	"	Indifferently known.	
	Brunswick Green (*d*).	Oxychloride of Copper.	Metallic Copper and Hydrochloric Acid.	(*See Verditer.*)	" Dried fruits, preserved green fruits.	Actively poisonous. Powerful gastric irritant.	(*d*) False Brunswick Greens, composed of Chromate of Lead and Indigo, are very generally used.
GREEN ...	Chlorophylle.	Chlorophylle Chromatite	Sap of various grasses.	... ...	" " "	Probably inert. Indifferently known.	
	Chrome Green.	Sesquioxide of Chromium	Native Minerals, or by precipitation.	Shetland Isles, Sweden, &c., &c.	" Tea.	Not distinctly known. Salts of Chromium are poisonous irritants.	
	Prussian "	Gambogic Acid and Ferrocyanide of Iron.	Gamboge and Prussian Blue, in various proportions.	(*See Gamboge and Prussian Blue.*)	" Gelatine.	Not poisonous, but should not be largely used.	
	Sap "	Rhamnine (?)	Juice of *Rhamnus catharticus.*	France, Britain, China, &c.	" Jellies.	Indifferently known. Not apparently injurious.	
	Scheele's "	Arsenite of Copper.	Soluble Copper Salts, by precipitation.	(*See Verditer*).	" (Pickles, preserved green fruits?)	Actively poisonous. Powerful gastric irritant.	
	Verdigris.	Acetate of Copper.	Metallic Copper, by solution in Acetic Acid.	(*See Verditer*).	" Pickles, preserved fruits, jams, jellies.	Actively poisonous. Gastric irritant.	
YELLOW and ORANGE.	Annatto (*e*).	Orellanic Acid (?)	Berries of *Bixa orellana.*	South America, West Indies.	" Milk, butter, cheese, Bath buns, pickled onions, &c.	Not known as deleterious.	(*e*) Often adulterated with injurious colours.
	Cadmium Yellow.	Sulphide of Cadmium.	Chloride or Sulphate of Cadmium, by precipitation.	Accompanying zinc ores.	"	Indifferently known. Injurious in large quantity.	
	Chrome "	Chromate of Lead.	Lead Salts and Bichromate of Potassa.	(*See Chrome green and Flake White.*)	" Bath buns, tea, (cheese?) currie, and custards.	Poisonous. Gastric irritant. Produces colic and muscular paralysis.	
	Fustic.	Morine.	Wood of *Morus tinctoria.*	Brazil, West Indies, &c.	" Bath buns, apricot jam, marmalade.	Indifferently known. Astringent.	
	Gamboge.	Gambogic Acid.	Exudation from *Garcinia cochinchinensis.*	Siam, Ava, Birmah, Ceylon, &c.	" Bath buns, tea, jams, jellies, milk.	Active purgative properties. Gastric irritant.	
	Gallstone.	... ...	Biliary calculus of ox.	Unknown.	(Confectionary?). Curaçao.	Not known. Probably inert.	
	Indian Yellow.	Euxanthate of Magnesia.	... ...	Various countries.	Confectionary.	" " Probably aperient.	
	King's "	Bisulphide of Arsenic.	Native Mineral.	... ...	"	Actively poisonous. Gastric irritant.	
	Massicot.	Oxide of Lead.	Metallic Lead, by oxidizing when fused.	(*See Flake White.*)	" Currie powder, mustard.	Poisonous. Produces lead-colic, muscular paralysis, &c.	
	Myrabolams.	... ...	Fruit of various trees (Bot. name uncertain).	India, Turkey.	(" ?)	Not known. Probably astringent.	

TABLE I.

Showing the Principal Foods, Drinks, Condiments, and Narcotics of British Commerce, the Substances employed for Adulterating them, and the approximate Per-centage of Adulterated or Sophisticated Samples (RETAIL).

FOODS, DRINKS, CONDIMENTS, AND NARCOTICS.	Per Cent. of Adulterated Samples.	ANALYST.	SUBSTANCES EMPLOYED FOR ADULTERATING THEM.						REMARKS.
			CLASS I.	CLASS II.	CLASS III.	CLASS IV.	CLASS V.	CLASS VI.	
Acids:—Acetic, Vinegar	57·0	W. L. Scott.	Wood spirit, tarry matters, &c.		Water	*Sulphuric acid*, brown sugar, &c. (a)			a Rarely with oxalic acid, probably from leaves of *oxalis acetosella*.
" Citric, "Lemon-juice," "Lime-juice," &c.			{ *Microscopic fungi* and *decaying organic matter* }		Water	Tartaric acid, *tartar*, sugar, &c. (b)			b Some "*citronade algerienne*" examined by me contained *no citric acid at all!* Lemonade is *said* to be sometimes adulterated with mineral acids.
" Tartaric, "Effervescing-powders," drinks, &c.					Water, white sugar	*Tartar.*			
Beer:—Ale, "Scotch," and other sweet varieties	15	" "	*Results of imperfect manufacture*		Water, sugar	Sugar, *chamomile flowers*, salt, &c.			c Also THORNAPPLE, *wormwood, bitter ash wood, "grains of paradise," salicine*, and even pure STRYCHNINE. Some kinds of gum may be added to Scotch ale to give richness.
" " "Bitter," "India," &c.	26	" "	——		Water, sugar	COCCULUS INDICUS, NUX VOMICA, QUASSIA, &c. (c)			
" Porter and Stout	24	" "	——		Water	—— *Sulph acid*, liquorice, br. sugar, *logwood*, salt, &c.			
" Articles used in manufacturing—Hops			Effects of damp, over-sulphur, &c.	*Erysiphe macularis and other fungi*	Spent hops, sweet-flag, &c.				
" " " Malt			*Results of imperfect manufacture*		Dried brewers' "grains," barley, &c.	Syrup washes, &c.			
Biscuits:—(See also *Flour, Bread, Butter, Sugar*, &c.)			*Micro. fungi, animalcules, lactic acid, &c.*		Water, *bad flour*, starches, *bone dust, &c.*	Salt, *alum*, various starches, &c.			
Bread:—Ordinary	87·0	" "	*Fungi, &c., lactic acid*		Water, *bad flour, bone dust*, potatoes, &c.	Potato, and other starches, *alum*, salt, *borax, &c.*			
" "Fancy" (See also *Butter, Sugar*, &c.)			——		—— *Chalk, plaster of Paris, &c.*	—— Carb. ammonia, gum, &c.			
Butter:—Fresh "Devonshire," "Epping," &c.	65·0	" "	*Butter-milk, curd, butyric, and lact. acid*		Water, lard, mutton, fat, starch, &c.	Fats, annatto, *saffron, nitre, &c.*	{ *Various colouring matters, &c.*, such as saffron, CHR. YEL., &c. }		
" Salt "Dorset," &c.	77·0	" "	——		—— Salt, nitre, *silicate of soda* (d).	——			d Some time ago butter was adulterated with *soluble glass* at certain large provincial towns.
Cheese			*Fungi, animal, lact. and valerian, acids, &c.*		Inferior varieties	Annatto.			
Chicory			Results of over-roasting	Ordin. dandelion roots, by error	*Brickdust, ochre, roasted seeds and roots*, dog-biscuit, oatmeal, dandelion, &c.	Coffee-grounds, burnt sugar, salt, olive, Venetian red, &c.			
Chocolate }	90·0	W. L. S. & L. A. C.	{ Results of over-heating, imperfect fermentation, &c. }	{ *Inferior nuts, unripe, old or germinating specimens* }	{ *Brickdust*, starches, oatmeal, linseed, *Red clays, sawdust, tallow, &c.* }	{ Var. fats, RED LEAD, *Venetian red, red ochres, clays*, sugar, salt, &c. }			
Cocoa }									
Coffee	92·0	W. L. Scott.	Impaired quality from over-roasting	(When green) damaged berries, &c.	Roasted corn, *beans, sawdust*, star. &c. (e)	Burnt sugar.			e Acorns, parsnips, etc. roasted, are occasionally added.
Condiments and Spices:—Allspice, &c. (powder)	60·0	" "	{ Results of improper preparation, packing, or of exposure to atmospheric influences, &c. }		*Brickdust*, cedar and other woods, and *sweepings*	Inferior spices, essences, &c.			
" " Cassia				Shrivelled and undeveloped specimen	Elm buds, &c.	Syrup, &c.		Elm buds (*f*)	*f* One instance of this adulteration has come under my notice.
" " Cloves				Shrivelled corollas, twigs, &c.	Spent cloves, myrtle-buds,* &c.	Burnt sugar, oil of cloves, &c.		Sp. clo. and im. do.	*The addition of myrtle-buds is doubtful (in my opinion).
" " Curriepowder	79·0	L. A. C.							
" " Ginger	72·0	"		Undeveloped and old roots	Flour, *chalk, plaster of Paris, &c.*	Cayenne pepper, &c.		Imitation ginger.	
" " Mace and Nutmegs				Injured and undeveloped fruit, &c.	*Betel nuts*, damaged samples, &c.	Oil of nutmegs		Betel-nuts, wooden nutmegs, &c.	
" " Mustard	100·0	W. L. Scott.		——	*Clay, plaster of Paris*, flours, radish-seed, oatmeal, &c.	*Turmeric, gamb.* annatto, *Cay. pep. &c.*			
" " Pepper	56·0	" "		——	*Brickdust, bonedust, slate*, flours, star. &c.	Capsicums, long pepper. lime, &c.			
" " " Cayenne.	85·0	" "		——	*Brickdust, clay*, oatmeal, *red wood chips, &c.*	Long pepper, &c.			
" " Vanilla.			Results, of improper drying, &c.	Unripe and damaged pods	Water, damaged and spent pods	Treacle, essences, benzoin, &c.		Other bean-pods.	
Eggs			Results of packing in lime, damp straw, &c.	*Addled and rotten eggs*	*Inferior and boiled eggs*			White eggs coloured like the rarer kinds (?)	
Farinaceous Foods:—Arrowroot	44·0	L. A. C.	Cellulose, &c., from insuf. washing, &c.		Potato, rice, and other starch, sago-meal, &c.	Dextrine.*			g Corn is often injured by the *uredo frumenti puccinia graminis*, and other fungi, also by insects such as the *musca pumilionis cecidomixia tritica*, etc.
" Flour			*Dust, sand (from millstones), bran, &c.*	*Results of diseased grain* (g)	Bad flour, bad barley, star. *plaster of Paris, &c.*	Salt, *alum.*			*Doubtful. Some "best Bermuda arrowroot" in my possession exhibits, under the microscope, when moistened with dist. water, some living animalcules about one-eighth of the size of the starch granules.
" " Barley, Oatmeal, &c.	4·0		——		*Dust, sweepings*, starch, sawdust	Salt, sugar.			
" Maccaroni			Results of damp, &c		French and other inferior	Alum		French	
" Millet			Dusts, husks, &c.	Seeds of other *graminaceæ*	Other seeds, husks, sand, &c.				
" Peas, Beans, Lentils, &c.			——	Damaged specimens, &c.	Damaged, inferior kinds, horsebeans, &c.	Gum, dextrine.			
" Sago, Tapioca, &c.			Results of over heating, &c.		Inferior and damaged varieties	——			
" Wheat (grain)			Husks, dust, shrivelled and inf. grains, &c.	*Smutted and mildewed grains, &c.* (h)	See 1st and 2nd Classes. Water, &c.	Steam (to swell the grains).			h Sometimes poisonous.
Fish (fresh)			Results of improper packing, &c.	*Partly decomposed specimens*	Inferior varieties	Salt, *chloride of lime, &c.*			
" (preserved) Anchovies	38	W. L. Scott.	*Results of improper preparation, &c.*	——	Sprats and other inferior varieties	RED LEAD, *bole, Venetian red, &c.*		Sprats and oth. fish	A common adulteration, or rather substitution.
" " Sardines and other varieties	29·0	" "	Decomposition from *rancid oil, &c.*		——			——	
Fruit (fresh) large varieties Apples, Pears, Oranges, Melons }			{ *Results of improper packing, handling, or collecting* }	{ *Undeveloped or decaying specimens, various insects, fungi, dust, &c.* }	*Washed, boiled, and false specimens*	*Alkaline and acid washes.**	}	*False specimens.*	* (Doubtful).
" " small varieties, Strawberries, Currants, &c. }					Inferior kinds, *wild fruits, berries, &c.*	*Solution of tartaric acid*			
" (preserved) Jams, Jellies, &c. }			{ *Products of ferm.*, &c., fr. use of *damp fruit*, unclarified sugar, imperf. prep., &c. }		Starch, gelatine, gum, &c.	*Various essences, colours, &c.*			
" " Marmalade }					Starch, &c., ord. oranges, turnips, &c.	*Gamboge, silicine, and various bitters.*	*Various colouring matters.* (i)		i Generally organic, and not often very injurious.
" " Various dried kinds			*Results of imperfect preparation, &c.*		*Inferior and damaged varieties*	*Various essences and colours.*			
" " " "Raisins," Currants, &c.			Dust, twigs, &c.	Damaged specimens	—— water twigs, &c.	Treacle of sugar, &c.			
Gelatine:—Isinglass	63·0	L. A. C.	{ *Fungoid growths* from being stored when damp, &c. }		Gelatine of various qualities	Isinglass (externally applied)	*Various colouring matters.* (i)	Gelatine.	
" Gelatine					*Glue, gelatinised paper, &c.*			Glue.	
Lard	52·0	W. L. Scott.	Results of decomposition		Water, potato, and other , mutton fat, pipe-clay, &c.	*Alum*, salt, carb. of soda, *lime, &c.*			
Liqueurs:—Curaçoa	31·0	" "	Decomposed syrup from over-heating, &c.		Water, syrup, molasses	Sugar, *capsicums, pepper.*			
" (various)			*Products of fermentation*		Water, gin, &c.	Sugar, salt, *nitro-benzole, var. ess. &c.*			
Meat (various)	9·5	" "	{ *Products of decomposition, &c.*	*Results of organic disease, &c.*	*Inferior portions of animal*	Salt, ARSENIC, *chloride of lime, &c.*			
" Pork, &c.			——	*Entozoa, &c.* PECULIAR POISON, &c. (j)	——	——			j Far more common in Germany and parts of Switzerland than in this country, although specimens of German sausage, etc. affected with it are occasionally met with here, even when of British manufacture.
" Tongue (ox)			Imperfect curing		*Old and diseased specimens*	Nitre, salt, &c.		Horses and cows tongues.	
" Various cooked and preserved varieties			Congestion from method of killing, preparing, &c.		*Diseased and inferior portions*	Pepper, salt, and various spices.			
" Poultry, Game, &c.	74·0	" "		*Results of various diseases*	*Damaged and inferior varieties, &c.*	——(When dres.) ARSENIC, &c. (k)			k. Solutions of ARSENIOUS ACID or ARSENITE OF POTASSIUM are constantly employed by poulterers and others for washing over poultry, game, etc., with the view of keeping them (superficially) fresh. The practice is a dangerous one, and cannot be too strongly reprehended.
Milk			*Results of bad feeding, &c.* }	*Taken at wrong periods*	Water, *butter-milk*, skim-milk	Annatto, *cerebral matter, chalk, &c.*			
Nuts (various)			*Results of damp, time, &c.*	*Unripe or decayed specimens, &c.*	Damaged and inferior varieties				
Opium			Woody matter, gum, &c.	Inferior specimens, &c.	—— clay, resin, &c.				
Oils:—Olive, Florence, Lucca, &c.			*Fungoid growths, &c., from exposure to air*	Colouring matter, &c.	Various animal oils, &c.				
Pickles:—"Mixed," "Piccalilly," &c. (See also *Vegetables, Condiments, and Vinegar*).	91·0	" "	(See Vinegar, &c.)		*Inferior vegetables, spices, &c.*	VERDIGRIS, COPPERAS (l) *capsic. &c.*	Var. green colouring matters.		l BLUE-STONE (sulphate of copper) is sometimes added to pickles to improve their colour; sometimes metallic copper is dropped in.
Spirits:—Brandy			*Fusel-oil, wood spirit, &c.*		Water, gin, &c.	*Pepper, capsicums*, molasses, salt, &c.			
" Gin	67·0		*Fusel-oil, &c.*		Water	——SULPHURIC ACID, *turpentine, &c.*			
" Other varieties			—— Acetic, *butyric, valerianic acids, &c.*		Water, inferior varieties, &c.	——*Various flavours, &c.*			* Doubtful, no *authenticated* instance has come to my knowledge.
Sugars:—Loaf			Native colouring matter, &c.		Chalk,* clay,* beet-root sugar, (m) &c.			Carrara marble.	m Beet-root sugar is probably derived from abroad.
" Brown	95·0	W. L. S. & L. A. C.	——*Various insects, fungi, &c.*, molasses		—— *Sand*, salt, starches, &c.	Spicules, &c. of mica (?)			
" Honey	22·0	" "	*Dust, products of fermentation, &c.*	Wax, peculiar flavouring principles, &c.	Water, flour, potato-starch, &c.	Sugar, various kinds, &c.			
Sugarplums (various articles of confectionary)			*Results of imperfect manipulation*		*Chalk, plaster of Paris* (n) *clay*, flour, star. &c.	Dextrine, molasses, &c.	{ SCHEELE'S GR. VERD. *gamb.* VERMIL. CHR. YEL. and GR. and other cols. poison. or inju. *Var. ess. mirbane*, OIL OF ALMONDS, fus. oil, ess. &c. and various narcotics. (p) }		n *Universally* in the icing of twelfth and other cakes.
Tea:—Black }	61·0	W. L. Scott.	{ Old and over-dried leaves, defective manipulation }	Old and inferior leaves, twigs, &c.	{ "*Lie tea*," leaves of *ash, beech, buckthorn*, oak, poplar, *sloe*, willow, (o) spent tea leaves, &c. }	*Black-lead*, lamp-bl., salt, *Prus. bl. &c.*		"*Lie-tea*" containing *no tea at all* but made up of sweepings, etc., coloured and "*faced.*"	o Tea is also (exceptionally) adulterated with logwood, rice in husks, spent tea re-dried, *felspar, soapstone*, and with various clays and colouring matters.
" Green }	78·0	" "		Old and inferior leaves, &c.		*Salts of iron*, cor, and LEAD, *turm. &c.*			
Tobacco:—("Bird's-eye," "Cavendish")			——	——	{ Leaves of rhubarb, dock, horse-chesnut }				p ORPIMENT (sulphate of arsenic) is (rarely) found in confectionary, probably by being mistaken for some other yellow colour. In various *cough lozenges* narcotic poisons are often added with dangerous liberality.
" Cigars			——	——					
" Snuff			Dust, inferior varieties						
Vegetables:—Fresh ordinary varieties }			{ *Diseased and blighted specimens, undeveloped and decaying specimens. Dust, insects, &c.* }	*Decaying or unseasonable*	*Old and damaged specimens*	Salt, carbonate of soda, &c.			q Poisonous, generally mistaken for the true vegetables.
" " Horseradish }				ROOT OF ACONITUM NAPELLUS (q)	——				
" " Parsley }				ÆTHUSA CYNAPIUM (q)	——				
" " Watercresses }				HELOSCIADUM NODIFLORUM (q)	——				
" " Mushrooms				*Var. species of poison, fungi, &c.* (q)	——				
" Dried or preserved varieties (See *Pickles and Sugarplums*)			*Results of imperfect manipulation*		*Inferior varieties*, water, &c.		*Various colours and essences.*		
Wines:—Ginger, Raspberry, &c.	64·0	W. L. Scott.	——*Veg. acids, fungi, &c.*		Water, *damaged preserves, &c.*	*Pepper, tart. acid, various flavours, &c.*			
" Foreign, Port, Claret, &c.	73·0	" "	Results of *Oidium*, tartar, &c.		Water, cider, elder wine, *extract of logwood, &c.*	Brandy, *capsicums, catechu, &c.*			
" " Sherry, Madeira, &c.			Results of *Oidium*, &c., in the vine		Water, ginger-wine,* &c.	Brandy, *capsicums, var. essences*, &c.			* Doubtful.
" " Champagne, and allied wines			——		Water, cider, gooseberry-juice, &c.	Tartaric acid, bicarbonate of soda, &c.		{ *False champagne from gooseberries, rhubarb, &c.* }	It is probable that *more than half* the "best champagne" is spurious.
" Allied beverages—Cider, Perry, &c.			*Results of bad fruit, imperf. manip., &c.*		Water, *vinegar, &c.*	——			

NOTE.—The names of adulterants more or less injurious to health are printed in *italics*, POISONOUS SUBSTANCES in small capitals. A dash rule —— in any column represents *all the substances* in the line immediately above it. L. A. C. signifies *Lancet Analytical Commissioners*.

In the above table the adulterants are thus classified:—
Class I. Results of imperfect purification or preparation, or of improper packing or storing, etc. (*fraudulent, or from negligence*).
Class II. (In articles sold in natural state, or nearly so.) Results of natural decomposition, organic disease, certain parasitical plants and insects, or various injurious specimens, apparently resembling the true ones for which they are sold (*fraudulent, or from negligence.*)
Class III. Adulterants employed as diluents (*fraudulent.*)
Class IV. Adulterants used for imparting fictitious "strength," flavour, or colour, etc. (*fraudulent*).
Class V. Substances not employed as adulterants proper, but for the purpose of additional ornamentation or flavouring (*highly injurious to health, but not legally speaking fraudulent*).
Class VI. Substances not employed as adulterants proper, being *substitutions* for or *imitations* of the true articles for which they are sold (*distinctly fraudulent*).

Yellow and Orange.	Ochre.	Ferruginous earth.	Native Mineral.	Super-oolitic bed, almost universally.	Confectionary, cocoa, chocolate, spices.	Inert, except in large quantities; then a mechanical irritant.	
	Orange Chrome.	Subchromate of Lead.	Soluble Lead salts, by precipitation.	(*See Flake White.*)	,, Mustard, currie.	(*See Chrome Yellow.*)	
	Orpiment.	Tersulphide of Arsenic.	Native Mineral.	Various countries.	,, Bath buns.	Actively poisonous. Gastric irritant.	
	Picric Acid.	Picric, or Carbazotic Acid.	Indigo, by oxidation with nitric acid.	(*See Indigo.*)	,, (,, ?), Marmalade.	Indifferently known. Probably injurious.	
	Safflower.	Carthamine.	Petals of Flowers of *Carthamus tinctorius*.	Egypt, Asia, Levant, Turkey, India.	,, Gelatine, marmalade, etc.	Indifferently known. Probably inert.	
	Saffron (*f*).	Polychroite.	Stigmata of *Crocus sativa*.	Cambridge, Sicily, France, Spain.	,, ,, ,, milk, butter, etc.	Not active, but, long taken, stains the tissues yellow.	(*f*) Many other vegetable yellows are employed, such as "French Berries" the (so-called,) "Dutch Pink" (used in the adulteration of Tea, &c.), but are of no special importance.
	Sumach.	... ...	Stem and root of *Rhus coriana* and *R. cotinus*.	Spain, Portugal, Italy, South of France.	,, Gelatine, marmalade (Semolina?)	In small doses, causes diuresis and perspiration; in large, vomiting and stupor.	
	Turmeric.	Curcumine.	Root of *Curcuma longa*.	China, Java, India, Madagascar.	,, Currie, opium, mustard, ginger, milk, cayenne.	Mild aromatic stimulant. Harmless.	
	Weld.	Luteoline and Luteoleine.	Leaves and stem of *Reseda luteola*.	Lancash. South of France, Italy, Germany, &c.	,, Marmalade, mustard.	Not known.	
	Quercitron.	Quercitrine.	Bark of *Quercus tinctoria*.	America. (Australia?)	,,	Indifferently known. Astringent.	
Red.	Alkanet Root.	Anchusine (?).	Root of *Anchusa tinctoria*.	South of France, Levant, &c.	,, Jellies, preserves, bottled fruits, wines, etc.	Inert.	
	Aniline Red—Magenta.	Aniline Red.	Aniline, by oxidation, &c.	... ...	,, Jellies, pres. currants.	Not poisonous. Tonic in medicinal doses.	
	Armenian Bole.	Ferruginous earth.	Native Minerals, by levigation.	Armenia, Italy, France, Great Britain, &c.	,, Anchovies, new sauces, and potted meats; cocoa, coffee, chicory, etc.	Those of peroxide of iron. Inert in moderate quantity.	
	Brazil-wood.	Brazileine.	Wool of *Cœsalpinia crista*.	South America, East and West Indies.	,, Jellies, pres. and bottled fruits, syrups, etc.	Not known.	
	Carmine.	Carmine.	*Coccus cacti* insect, by infusion, &c.	Mexico. South Carolina. West Indies.	,, Jellies, pres. and bottled fruits, syrups, port, claret, gelatine, etc.	Inert.	
	Indian Red.	... ...	... ...	... ...	,,		
	Logwood.	Hœmatoxyline.	Wood of *Hœmatoxylon campechianum*.	Campeachy, Honduras, Jamaica.	,, Jellies, pres. and bottled fruits, port, gelatine, etc.	Not poisonous. Astringent. Injurious in quantity.	
	Litmus.	Orceine, & various acids.	*Rocella tinctoria* and other lichens.	Canaries, Cape Verd Isles, Levant, &c.	,, Jellies, pres. and bottled fruits, port, gelatine, etc.	Indifferently known. Inert.	
	Madder.	Alizarine and Purpurine.	Root of *Rubia tinctorum.*	Italy, Levant, South of France, Holland, &c.	,, Jellies, pres. and bottled fruits, port, gelatine, etc.	Indifferently known. Inert.	
	Murexide.	Murexide, or Purpurate of Ammonia.	Guano, by oxidation of Uric acid, &c.	Africa, Mexico, Peru, &c.	,, Jellies.	Not known.	
	Realgar.	Bisulphide of Arsenic.	Native Mineral, and artificially.	Various countries.	,, Cayenne pepper (potted meats?)	Actively poisonous. Arsenical gastric irritation.	
	Red Lead.	Oxide and Binoxide of Lead.	Metallic Lead, by oxidizing when fused.	Derbyshire, Northumb., Cumb., Devon, &c.	,, Cayenne pepper, potted meats, anchovies, etc.	Poisonous. Gastric irritation. Colic. Muscular paralysis.	
	Turnsole.	... ...	(*See Litmus.*)	(*See Litmus.*)	,, Jellies, pres. and bottled fruits, port, claret, etc.	(*See Litmus.*)	
	Venetian Red.	Sesquioxide of Iron.	"Copperas," or Sulphate of Iron, by calcination.	... ...	Cocoa, chocolate, coffee, chicory, etc.	Slightly injurious, in large quantities. Otherwise inert.	
	Vermillion.	Sulphide of Mercury.	Native Cinnabar.	Mexico, California, Peru, Almaden, &c.	,, Confectionary, cayenne pepper.	Poisonous. Gastric irritation. Mercurial ptyalism.	
Brown	Sepia.	Sepia.	Ink-bag of *Sepia officinalis*.	Seacoasts of temperate countries.	Confectionary.	Not known. Probably inert.	
	Sienna ("raw" and "burnt").	Ferruginous earth.	Native Mineral.	Tuscany, various parts of Germany.	,, Cocoa, chocolate, coffee, etc.	Injurious in large quantities, as mechanical irritants. Otherwise inert.	
	Umber ("raw" and "burnt").	,, ,,	Native Mineral.	Isle of Cyprus.	,, Cocoa, chocolate, coffee, etc.		
	Vandyke Brown.	,, ,,	... ...	... ...	,, Cocoa, chocolate, coffee, etc.		
Black	Black Lead.	Carbon.	Native Graphite, and artificially from coal.	Cumberland.	,, Tea, pepper.	Probably inert.	
	Ivory Black.	,,	Bone, &c., by calcination in nearly close vessels.	... ...	,, ,, ,,	Inert.	
	Lamp Black.	,,	Resin, &c., by burning and deposition of smoke.	... ...	Tea, pepper.	,,	
	Spanish Black.	,,	Cork, by burning without access of air.	... ...	,, ,,	Nearly inert. Slightly astringent.	

interesting specimens of "brick-teas," "tea-lozenges," and other curiosities, lent by the Council of the Royal Asiatic Society, are contained in the glass-case before you.

Coffee is not often very injuriously adulterated, but it is painful to reflect how people, especially poor people, are at once defrauded of their money and robbed of their health by the vendors of ground coffee, both in London and the provinces, for, out of every 100 samples obtained from retail dealers, I do not believe that more than eight will be genuine unsophisticated coffee of the quality inquired for.

Coffee, in all its varieties and conditions, may be distinguished from chicory, or any other roasted roots and beans, with the aid of the microscope. The pure article should leave a white ash when burnt, and should not immediately impart a colouration to cold water, as a "mixture of chicory and coffee" will do. Chicory, in its turn, is adulterated with inferior roots, brickdust, and Venetian red.

The cocoas and chocolates of commerce are adulterated to an extent which I must simply term frightful,—at this moment I hardly know a wholesale or retail establishment selling the pure ground nuts. On this account, I have not accepted specimens of cocoa from anyone,—for I need hardly tell you that the samples of food-products before you have been kindly contributed by various manufacturers and importers of whose high character and general respectability I had previously assured myself.

Time will not permit me to describe at length the adulterations of wines, spirits, and beer; their detection, too, is often so laborious a task that a non-scientific man would utterly fail in attempting it; so he had much better, before "ordering in a quantity," take Dr. Lankester's advice of last week, and hand the sample over, with a fee, to a professional chemist.

On one point relating to beer I will make a single observation, viz., that I have actually detected strychnine in two samples of bitter beer. Specimens of porter, double stout, and pale ale, from the brewery of Messrs. Gasthorne and Co., of Westminster, are on the table; I can bear testimony to their remarkable purity.

I have thus briefly and imperfectly laid before you a few of the leading facts connected with the heartless system of adulteration practised with our daily food, and I beg to apologise for the incomplete nature of my illustrative specimens in some sections, arising from circumstances over which I had no control. The provisions of the recent Act for preventing adulteration are so well and so generally known that I need not enumerate them here. Two remarks, however, may not be out of place. The people of this country, I hold, are *not* indifferent to the subject, as is constantly asserted by interested parties, but do not know in what way to act, or how to obtain redress for their wrongs; deeply and cruelly do the people feel how hard it is that their daily bread, for which they all work, for which, too, let us hope they all pray, should be falsified and deteriorated with impunity, knowing too that as long as the monster adulteration exist, so long will it bring death and disease to them and those dearest to them, and pour a golden stream into the purses of its worshippers.

Still, the difficulty may be mastered in one way, and to the possibility of that way being opened up, thousands of our countrymen are now looking forward in anxious expectation. Need I say that what science unaided cannot do, what legislature as it stands cannot attain, may be accomplished through the instrumentality of the "Society for the Encouragement of Arts, Manufactures, and Commerce."

I do not hesitate to assert, and I entreat the Council of this Society to give this suggestion of mine their best and most earnest attention, that if a Special Committee were appointed on the adulteration of food and drink, the evil might be greatly lessened in three years, and almost annihilated within six or seven.

Among the members of such a committee, trade and manufactures, commerce and law, chemistry and medicine should be well represented; and among the more important of their duties would be—

1st. The adoption of a series of standards of those goods whose legitimate composition is at present indefinite, such as vinegar, cocoa, currie powder, &c.

2ndly. The consideration of what colouring-matters should be permitted to be used by confectioners and others, and of those which should be prohibited altogether.

3rdly. The extension and improvement of detective analysis in points where it is now deficient.

4thly. The consideration of the best steps to be taken to prevent the importation of adulterated articles. And,

5thly. To give all possible aid to William Scholefield, or any other man, who will endeavour to introduce a more stringent measure for the suppression of adulteration than is now in existence.

In conclusion, I have most gratefully to acknowledge the kind assistance accorded to me by Dr. Forbes Watson and Sir Emerson Tennent, in furnishing me with certain statistical information; by Mr. W. Neal, of the Royal Asiatic Society; and by my brother, Mr. C. A. Scott; to these, and several other gentlemen, I beg to tender my best thanks.

DISCUSSION.

Mr. Leonard Wray said the paper they had just heard read mentioned the adulteration of tea, and thus afforded him an opportunity of referring to some assertions that he made at the last meeting on that particular point. In the paper which he had the honour of reading on that evening, he stated that seven-eighths of all the tea imported from China to the United Kingdom, of the last crop, was adulterated; and he gave, as his authority, the minutes of a meeting of tea merchants, held at Canton, on the 18th of April last. He had not, however, at that time the pamphlet containing those "minutes," but was speaking from the letter of a gentleman who had been for upwards of 20 years connected with the wholesale tea trade of London, and who, by referring to those "minutes," led him (Mr. Wray) to believe that the statement, as to the amount of adulteration, emanated from that meeting. He had since obtained the pamphlet, and although he certainly was in error in this one particular, yet it appeared from the testimony of this gentleman, that there really was no exaggeration in the statement that seven-eighths of the last crop of tea imported into the United Kingdom was more or less adulterated. In the *Morning Star and Dial* of Monday, the 28th inst., that gentleman, Mr. William Green, of Forest-hill, wrote as follows:—

"The Society of Arts, through the assistance of Mr. Wray, has done a great public service, in making known the extent of adulteration of tea in China, when intended for the English market. A correspondent of the *Star and Dial*, of Friday, doubts the correctness of the statement that seven-eighths of the tea imported here is adulterated. That, I believe, is rather below the fact; and that a gentleman of practical experience for 22 years should be startled by the announcement, surprises me. The character of the last five years' importation, however, powerfully sustains the averments in Mr. Wray's paper. The initiated, as well as the general public, will permit me to say that the adulteration—for convenience—may be described as of two classes, the positively spurious and the sophisticated. The former is known in the trade as Tayshan Congou; it also represents most of the pekoes, capers, and Canton greens. In their manufacture is employed exhausted leaf; also leaves from three plants, *Gynura auriculata*, *Ardisia erispa*, and a common species of mint. These teas are mostly from Canton and its locality, and their quality for the most part is execrable. Those which I have denominated as "sophisticated" are from Foo-choo-foo; and for purity they rank higher than the former. The adulteration has, however, gradually extended and increased for the last five years. The new crop of this class has just arrived. It is nearly all refined and re-manipulated, having had large quantities of old and common leaf incorporated, though imported and sold as new and fine tea, &c., &c."

Now, if this testimony had emanated from an inexperienced

man, he (Mr. Wray) should certainly not bring it before the meeting; but Mr. Green had had very great practical experience; he was in one of the largest wholesale tea warehouses in London, and, for the last twenty years of his life, had had daily experience in the article of tea. He could have no hesitation, then, in giving him as an authority. Mr. Green had promised to attend there to-night, if possible, in order to support in person the assertions which he had not shrunk from publishing to the world through the newspapers. The main point, then, in that part of his (Mr. Wray's) paper, which treated of the enormous amount of adulteration practised by the Chinese on the teas they sold to our merchants, remained as he had stated it be. They must all, however, be glad to know that our highest merchants in Canton had pledged themselves not to purchase any teas which they knew to be adulterated; although the British Consul, Mr. Winchester, distinctly told them that success could scarcely be hoped for so long as the foreign buyers continued, in the hope of gain, to purchase these adulterated articles of the Chinese. The object of this Society must be to elicit and to disseminate truth, so that whatever subject it had in hand might be presented to the public in the clearest possible light, and free from all suspicion of incorrectness. Let this question of tea, then, be thoroughly and impartially investigated.

Mr. W. J. BLAND wished sincerely that the same fairness which characterised this Society was displayed also by the members of the public press, who had chosen to insert the views of one side of the question, but utterly refused to publish the other side of the case. His letter to the *Star* newspaper, in reply to the strong assertions of Mr. Green, had been denied publication in that journal. If an opportunity were afforded him, he was prepared entirely to disprove the statements which had gone before the public in the *Journal* of this Society. He would take upon himself to say, from the past history of the tea trade, that, so far from seven-eighths of the tea which came over to this country being adulterated, not one-eighth of our annual imports of that article was adulterated. As an old member of the Society, he had in former years brought forward facts upon this subject in the presence of Mr. Twining, Mr. Gibbs, and other leading members of the tea trade; and now, looking to the statements put forth in this room at the last meeting, he asked that the gentlemen who had made those assertions as to the alleged amount of adulteration of tea should bring forward evidence in support of them. If, as was alleged at the last meeting, seven-eighths of the tea now in our bonded warehouses was adulterated in the manner described, let them bring samples here, and he would undertake to prove that it was not adulterated or sophisticated. He claimed that this should be done, because the last speaker had urged upon the meeting to give an opportunity for candid investigation into the question, and, as he had previously stated, he was ready at any moment to come forward with proofs in support of what he had stated—and he would add that at no time within his own recollection were the public ever so safe upon the subject of tea as they were at the present time, for they now had teas of better character than was the case under the former *régime* of the East India Company. He unhesitatingly made these statements, and would be prepared to substantiate them.

Mr. WM. HAWES confessed that he could not commence his observations upon this paper by characterising it, as it was generally in his power to do, as an able and useful one. He thought when charges of adulteration of food were dealt out in the wholesale manner in which they had been that evening, much more was required than the simple statement, before such charges would be received by an assembly such as he now saw before them. To say that 87 per cent. of the bread they ate was adulterated, if not entirely false, was, in his opinion, a gross misrepresentation. To say that seven-eighths of the thousands of tons of teas in our warehouses was adulterated to the extent alleged, was in his opinion a misrepresentation. What did adulteration mean? Did it mean that seven-eighths of the article so called was not tea? or did it mean that some processes were employed by which a different character was given to it (let them call it adulteration if they would), but which did not affect either the wholesomeness or the quality of the tea? If it was intended to take refuge under that statement, he would say that the assertion that this was practised to the extent of seven-eighths of the total quantity of tea imported into this country was a misrepresentation. If seven-eighths was not tea at all, then it was but fair that the promulgators of such a statement should describe what the article really was. When it was alleged that the dealers in corn were guilty of such gross fraud that they put 12 inches of good corn on the top of the sacks, and 20 inches of bad corn at the bottom, it ought to be proved by bringing a sack of corn bought in Mark-lane into that room. In his opinion, the great mass of traders in this country were not so thoroughly dishonest as this paper would lead them to believe. That there were fraudulent merchants and traders they all knew; but, when they went through the whole list of articles forming the chief aliments of the population, and asserted that not one-half of the things they bought were pure—not half were the articles they were represented to be, he repeated that very much more proof than had been given by one individual, was required before they would consider those charges substantiated. The fashion of dealing in these assertions was too common. They had a recent act of Parliament to protect them against adulteration of food. This was in his opinion a part of that paternal system of legislation which he thought had in this country passed away for ever, and it did virtually pass away when the House of Commons gave up the assize of bread, and testing for the purity of a variety of other articles of food. The public would generally take care of itself in such matters as these, and the less Parliament interfered with those petty details of life the more secure the public would be. What were the effects of the excise laws, to preserve them from adulteration? None whatever. Let them legislate upon this subject as much as they would, all that legislation did was to show what the dishonest trader must avoid, and to drive him to some other means of arriving at the same end. Legislation on such a matter was all thrown away. The paper summed up the long list of grievances by telling them the means by which the evils complained of could be remedied. What were those means? The Society of Arts was to appoint a Committee from its own body, which in three years was to lessen adulteration very considerably, and in six years to destroy it altogether. The whole world had been trying in vain to effect this object; but the Society of Arts, by a Committee appointed by itself, with no public responsibility whatever, was to drive out this great bugbear of adulteration, and in six years! Was it possible that if seven-eights of their tea was adulterated; that if twelve inches of good corn would conceal twenty inches of bad corn; that if pickles were adulterated with copper; if that deleterious admixtures were compounded with our pepper and mustard; and, indeed, every article sold by the butcher, baker, grocer, fruiterer, and greengrocer were sophisticated or adulterated, that all this could be remedied in six years, by a committee of this Society—a committee of traders, chemists, and *dilettanti* members—men appointed by this Society! He could never conceal his opinion upon such questions as these. He believed legislation upon them acted perniciously. He believed this microscopic examination of food—though very beautiful, perhaps, in itself—was of little practical service to the public, and worse than useless if it led to such statements as had been made that evening. He disagreed with the author of the paper in many of the points brought forward. He believed the results arrived at were exaggerated, and the remedies suggested were of the most futile kind.

Dr. Lankester confessed he had not expected to hear such a speech as that he had just listened to. He was surprised that a member of the Council should turn into ridicule the application of science to the practical arts of life; and he felt that, even supposing some indiscretions had been committed by Mr. Wentworth Scott, nothing could warrant the severe remarks which they had just heard. He wished this subject could be discussed without any unpleasant feeling, and he would endeavour to bring back the meeting to look at the scientific facts which the paper had brought before them. Were they to believe Mr. Scott's assertions as an honest man, or not? Were they to credit his statement that 60 per cent. of the bread he had tested was adulterated with alum or not? Mr. Scott was prepared to stake his reputation upon the matter, and on that ground he (Dr. Lankester) believed him. This was not the first time they had had this subject before them. They all recollected the analyses of food which were given in the *Lancet*, and yet he never heard it said that Dr. Hassall had given publicity to that which was untrue, or that he had unduly libelled the tradesmen of the country. He (Dr. Lankester) did not for a moment pretend to say that all persons who sold adulterated goods were aware of the extent to which the adulteration existed; but let them not encourage men to believe that they might put deleterious substances into food, and as long as this could not be detected, they were to go free. Mr. Scott, by the aid of chemistry, had shown the public what they were taking, and had warned them what they ought not to take. He had shown that the public required more scientific knowledge upon these subjects. He had brought before them a series of facts which showed the necessity, not only of the community being instructed in the elementary details of science, but also that tradesmen who wished to deal in an honest article should know something of the nature and scientific character of the products which they sold, and something of the laws by which human life was regulated. If a tradesman received a chemical education, he would be able to detect many of these adulterations. There, for instance, was a bottle of pickles which was manifestly adulterated, and which stood side by side with an unadulterated article. The vendor of that article knew it was not genuine—he knew the West Indian pickle was adulterated, and anyone who ate freely of it at supper would find this out in the course of the night too. Such a thing should be put down, and if they were unable to effect this through the medium of the ordinary influences which operated upon society, they might fairly ask for the help of the legislature in the matter. He was surprised therefore to hear a gentleman, whom he knew advocated the amendment of the laws of this country, condemn legislation upon this subject. With equal reason they might condemn legislation for the criminal who robbed his employer, as for those who systematically sold bad articles of food over the counter. Surely the legislature, which was effective in the one case, would be effective also in the other case; and he contended that the hon. member for Birmingham, who carried that bill through the house was right in endeavouring to set legislation in motion on such a subject. What he complained of was that, like too many acts of Parliament, it was insufficient, and could not be practically worked. The fee that was fixed for the analysis was too small to insure a proper investigation by the chemist; it would not pay him for the time that was occupied by it. In the next place, the person who sold the goods must be proved to have a knowledge that he was selling an adulterated article, and, unless they brought that guilty knowledge home to him, he could not be convicted. He hoped that further legislation would be really effective. The existing act had, however, been the means of calling attention to the fact that there was something like legislation going on, and that there were means by which these practices could be prevented. With regard to the question of tea, it was one which could be answered by the analytical chemist alone. Let them not permit any gentleman who was only a dealer in tea, and knew nothing of chemistry, to say that tea was not adulterated; but it should be put into the hands of the botanist to say whether there were other leaves with it than those of the tea plant; and into the hands of the chemist to say whether there was anything besides the natural product. He would not take the opinion of a man who had dealt in tea for 25 years, if he knew not how to distinguish between the leaf of tea and the leaf of any other plant. Let them not, upon such evidence as that, decide that tea dealers were too honest to sell bad tea. Passing over the subjects of the paper, he would say that he thought Mr. Wentworth Scott had brought before them a number of practical hints by which persons with a limited knowledge of chemistry might assist themselves in judging whether an article was adulterated. With regard to bread Mr. Scott's process for detecting alum was, perhaps, too complicated for general application, for alum was not easily detected, and he warned persons against concluding from such evidence as Mr. Scott had brought forward as to the presence of alum in bread. He (Dr. Lankester) thought the test of the blow-pipe was more satisfactory in that case. Mr. Scott had spoken of the adulteration of meat. There was an astounding thing! In the newspapers of that day there was an account of hundreds of pounds of meat having been seized a few days ago by the sanitary authorities of the City. There was the fact of the unwholesome meat being exposed for sale in the market. He knew how common it was to bring into the markets of London measled pork, which, once seen and known, would always be recognised as diseased; which, when eaten by human beings, resulted in the production in the stomach or bowels of a worm, which was the pest of life ever after. Ought the public to be protected from such things as these? That pork, if not sold in joints to the public, found its way to the sausage-makers; and were they not to interfere between her Majesty's subjects and the horrible tapeworm? Mr. Scott had also referred to the adulteration of pepper and other spices. There was always more or less difficulty in detecting adulteration in powders. These ginger, pepper, and mustard powders might contain almost anything, for what the public knew, and it was not easy for them to ascertain what they really were. Upon this part of the subject he need only refer them to the great Liverpool pepper case, which occurred within the last twelve months. They saw from that how very difficult it was to detect the adulteration of those spices. It was frequently to the interest of tradesmen to adulterate even only to the extent of 5 or 10 per cent., to enable them to undersell their neighbours to that extent; so that there seemed to be good reason why the government should be alive even on this matter. Even in cases where there was no Excise duty to be protected, there was an equivalent of value which no government ought to overlook. Human life was money value. A slave in America would be worth from £100 to £200, and surely the life and labour of a human being in this country was worth that amount. Therefore, as a mere money question, it behoved the government to see that the most stringent measures were carried out to detect the adulteration of food.

Dr. Kinns wished to mention the fact, that whilst staying with a friend in Derby, last summer, he had the most convincing proofs afforded him that plaster of Paris was used by tons for the adulteration of mustard. It was sent in very large quantities to some of the largest mustard manufacturers in the kingdom.

Mr. Wm. Green had attended solely for the purpose of confirming the statements he had made in print, as alluded to by Mr. Leonard Wray, upon the subject of the adulteration of tea, which had occupied a large share of his attention during the last five years. His experience in one of the largest houses in the kingdom for twenty years had been, that teas were very largely adulterated; and he was prepared to stake his reputation upon the statement he made, that of the tea which had been imported into

this country during the last three years seven-eighths was adulterated. Startling as that statement was, he might, perhaps, add an explanation, which would, in some measure, qualify it. Mr. Wray had correctly stated, he believed, the extent to which the tea was adulterated in putting it at seven-eighths, and that only one-eighth was absolutely pure. Out of the whole quantity one-eighth might be regarded as a spurious material altogether; that left three-fourths of the stock to be more or less adulterated or sophisticated. That three-fourths might be taken to be adulterated to an extent varying from 1 to 50 per cent.; and if Mr. Bland (who might be looked upon as one of the fathers of the tea trade) could convince him that no adulteration took place, he should be happy to acknowledge himself mistaken. He felt it was impossible, whatever a man's knowledge of tea might be, to detect adulteration in it when carried to a comparatively small extent. He would say that of the entire crop of Foo-choo-foo tea which had just arrived, he believed there were but few lots that were absolutely pure. He had obtained some lots of that tea, and he found that although it was only three months old, it had already deteriorated in commercial value to the amount of 6d. per lb. Then with regard to the black tea of Congou, the orange pekoe, and other varieties, he believed the assertion that seven-eighths was adulterated was borne out by the facts. He believed the quantity of tea exported from this country amounted to about 10,000,000 lbs. annually, shipped principally to northern ports, and it was some consolation to know that the tea so exported consisted chiefly of the most inferior qualities. He had waited anxiously to hear some suggestion by which this confessedly great evil might be remedied or overcome; and it appeared to him that, as long as they carried on a war with China, as long as they exacted compensation for such a war, and as long as they taxed the produce of that country at home, it was in vain to expect they could get a true and genuine article in tea. He would urge upon those who were anxious to be delivered from this evil, that they should direct their attention to the obtaining of teas direct from the grounds where they were grown.

Dr. NORMANDY could not state what was done with the tea in China, but he could, as an eye-witness, give them some information as to the treatment it received in this country, at the hands of large and so-called respectable dealers. They were aware that the tea came to this country in cubical boxes, enclosed in a thin sheet of lead, which was soldered in a manner so exquisitely beautiful, that no European plumber could imitate it. In the event, therefore, of that metallic sheet being ruptured, it could not be re-soldered without immediate detection. The practice, therefore, was to cut a hole in the metallic sheet sufficiently large to admit the introduction of the hand to take from the chest a sample from which the dealer decided as to his purchase. The tea having been delivered in the chests to the purchaser, then came his own process of sophistication. If the seam in the metallic sheet could be imitated or reproduced, the task would be an easy one, but as that could not be done, the chests were emptied of their contents through the hole to which he had alluded, and the tea was poured out in a room appropriated to the purpose, the floor of which was kept very smooth and clean. A mixture of various descriptions of tea was then made in a heap, turned over with wooden shovels, and the chests were refilled through the same hole; the compression of the tea in the chest being effected by the hand in the first instance, and afterwards by the foot. In that manner the chests were repacked with a different article from that which they originally contained, and they were then ready for sale by the dealer. He begged to state that he had seen the process carried on in one of the largest tea houses of London, and he would therefore vouch for the correctness of his statement. With respect to bread, he was in the habit of analysing many hundred samples every year, and he could say that, at one time he never met with bread entirely free from alum. It was not his purpose now to discuss the question whether alum so administered was injurious to the human system or not. The question was whether alum was actually present in bread or not. He had been instrumental in convicting about a hundred bakers for adulteration of bread, and he might state that, of the cases so brought forward, the largest proportion pleaded guilty to the charge. He was happy to say that his experiments in this matter showed that a decided improvement had lately taken place in the general quality of the bread submitted to him, inasmuch as out of twenty-three samples of bread sent to him, at the instance of the magistrates of Wandsworth, only nine were found to contain alum, so that it would be seen that they were improving, and it was to be hoped that legislation had done something towards mitigating the evil.

Mr. T. A. MALONE wished to set himself right with respect to what he had stated at the last meeting as to the adulteration of tea with the substance known as *Valonia*. Professor Bentley having questioned that assertion, he (Mr. Malone) would now state that a piece of *valonia* was put into his hand by the son of a large tea merchant, who told him that it was a substance used in the sophistication of tea; and it was upon that authority (which he considered a good one) he made the statement at the last meeting. At the same time, he laid no claim to having discovered any ready means by which the presence of that substance in tea could be detected. He had been told by a gentleman present, acquainted with the subject, that *valonia* could be used in such a manner as to deceive the most experienced judges of tea; in fact, he was inclined to doubt whether chemical appliances were sufficient to detect that kind of sophistication. It had been said that there was equal difficulty in detecting some methods of adulterating tobacco; and he had heard it said of an eminent analyst that he was able to adulterate tobacco in such a perfect manner that he could not afterwards detect his own work; and he believed that remark applied in a great measure to the sophistication of tea. The injurious effects of tea upon some constitutions were attributed to the astringent properties it contained. He believed those properties could be modified by the use of gelatine; and, in his own experience, he had rendered tea more agreeable to his palate by the introduction of a few strips of isinglass into the infusion. The general opinion, he believed, was that the principle in tea which was known as *Theine* acted unfavourably upon the nervous system of some persons, and the amount of that principle (which could be detected by treatment with benzole), might form some test of its action upon the human system.

Dr. RIDDELL remarked that the question of tea had been more or less discussed during the last ten years. His own experience had been principally confined to such articles as pickles and sauces. Soy was an article which contained very nutritious properties. It contained a larger quantity of nitrogen than any other kind of food used by the Chinese, and it appeared they had discovered that to be case, and therefore used it in large quantities. People frequently now would see, in the shop-windows of London, a peculiar-shaped jar, labelled "Japanese Soy," but that jar contained a cork, and if the article was what it purported to be, the wonder was how the cork got into the bottle, considering the Japanese did not use corks. A very favourite condiment in this country was mushroom ketchup, and when they purchased it, the shopkeeper could do no more than tell them that he bought it for genuine, and he hoped it was so. Very good "mushroom" ketchup was, however, said to be made from horse's liver; and a lady in India had told him she always made her "mushroom" ketchup from calves' liver. Some remarks had been made with regard to curry powder, and it was stated that it could be made without turmeric. He believed he could put his hand upon 400 different receipts for making curry powder, written in Persian, so that it would be difficult to make a universal curry powder. With regard to pickles, he believed very little East Indian pickle was sent

to this country. Girkins certainly would not be found in India. The West Indian pickles consisted chiefly of mangoes. With regard to cayenne pepper, the public taste was in favour of a red-coloured article, although it was difficult to conceive how a genuine pepper of that colour could be furnished from a dark-brown or yellow chili.

The Chairman said he had listened with satisfaction both to the paper and to the discussion upon it. It had been truly stated that the object of this Society was, upon every subject that it touched—as far as human means could do so—to promote and elicit truth; but it would be quite understood that the Society did not hold itself responsible for the views that were advanced in the papers brought before these meetings, or for the facts therein stated. It was hardly possible to conceive that a subject of this kind, arraying on the one side charges against the commercial classes of the country, and on the other side persons who naturally desired to screen themselves from the imputation of supplying unwholesome food—that a discussion of this kind would not call forth a little temper; he was glad to see it had not been carried further. The probability was that on one side there might be an exaggeration of facts, and on the other side an over anxious zeal to defend interests of which these persons were in some degree the representatives. Under these circumstances, perhaps they might look for the truth between the two extremes. There was one subject to which he would more particularly allude. With regard to the public health, he thought the statistical returns showed that to whatever degree the adulteration of food was indulged in, the value of human life had in modern times greatly increased. That was a strong fact, but there were other circumstances to be regarded, which, he thought, would not afford equally satisfactory results. During the last year he had been a visitor of one of the largest lunatic asylums in the world, where there were now 1,800 and 1,900 lunatics in one building, and the great increase of lunacy in this country had attracted the attention of everyone who had considered the subject. It was undoubtedly the opinion of the most eminent physiologists, and men conversant with the human frame, and the action of food upon it, that some extent, if not a considerable portion of the increase of this malady, might be traced to the effects upon the nervous system of deleterious substances, which it was to be feared were but too commonly mixed with articles of food supplied more especially to the poorer classes of the community. He thought, with respect to the paper, nothing had transpired which ought to deprive the author of it of the usual compliment which was paid upon these occasions. He would therefore take the sense of the meeting upon the proposition that a vote of thanks be given to Mr. Wentworth Scott for his paper.

A vote of thanks was then passed to Mr. Scott.

The Paper was illustrated by specimens of unadulterated food, kindly lent by various persons therein named, as well as by a collection of articles lent by Mr. T. Twining from his Economic Museum, intended to illustrate the adulteration of flour and bread. The microscopic detection of adulteration was illustrated by several microscopes contributed by Mr. Baker. The thanks of the Society are tendered for these contributions.

The Secretary announced that on Wednesday evening next, the 6th inst., a paper by Mr George R. Burnell, C.E., F.G.S., F.S.A., "On the Condition of the Water Supply of London," would be read.

Mr. John Postgate writes:—I think that some expression of opinion by the Society of Arts would tend materially to remove a misconception which prevails respecting the provisions of the recent Act of Parliament for the prevention of the adulteration of food or drink. The first clause of that Act makes two offences; one, that of selling knowingly articles adulterated with substances injurious to health, and would require proof of such knowledge before conviction; but the other goes to the root of the mischief, and places a remedy in the hands of the public—for it expressly states, "every person who shall sell, *as pure* or *unadulterated*, any article of food or drink which *is adulterated or not pure*, shall, for every such offence," &c., forfeit and pay a penalty not exceeding £5, with costs; and for a second offence the name and residence of the offender may be advertised at his expense in the newspapers. It is, therefore, perfectly clear under this Act, that purchasers have only to ask for the pure article and request the seller to label it as such—and equally clear is it that impure and adulterated articles of food or drink must be sold as such; but, even these may bring the seller under the law, should they contain any material hurtful to health, as the magistrates may refuse to admit a plea of want of knowledge of his business by the seller, or that no means of knowing (an analyst being appointed in his district) existed within his reach. Respecting the public analysts appointed, it is of the highest importance that they should be, not only well skilled in chemistry and the use of the microscope, but also persons of well-established reputation for integrity and honourable conduct, otherwise the power placed by this act in their hands may be used for very bad purposes; and, I think, in all cases where analysts are appointed by local authorities, the inspectors of meat and markets should be ordered by those bodies to make purchases, submit them to the analyst, and initiate the proceedings before the magistrates; a work quite within their duties, and one that may be carried on under this act of parliament. It now rests with corporations to protect the community against the great evil of adulteration, and avert such calamities as occurred at Bradford and other places. I am glad to find, as the originator and worker of this question for several years, that the Society of Arts has taken this important matter up.

Edgbaston, Birmingham.

WOOL AND SHODDY.

Messrs. Littledales, Liverpool, in their circular say:—

"The position of the woollen and worsted trades throughout the manufacturing world is such as to bespeak grave reflections, and ought to command an active sympathy—they are not extending in the same ratio as other branches of industry, and are precluded from doing so for want of adequate supplies of the raw material. The cry of scarcity which has been sounded for the last eight or nine years has produced no practical effect, the small increase of growth having been absorbed without any relief. In England, economising expedients have been resorted to on an enlarged scale. The use of cotton in woollen and worsted fabrics has been vastly augmented; and the manufacture of rag-wool (which consists of old worn-out woollens, torn or ground up) has been developed into quite an important branch of business, under the name of "Shoddy" or "Mungo," being utilised to the extent of 38,880,000 lbs. annually (equal to about a fourth of our yearly importations of colonial and foreign wools), for the purpose of mixing with or adulterating wool in its manufacture; and yet, with these enormous aids, the prices of wool when not checked by adverse extraneous influence, ever gravitate to an extreme range, such, in fact, as effectually to limit the consumption. We have latterly congratulated ourselves on the achievement of the French Treaty, as likely to create a new outlet for our manufactures, woollens and worsteds amongst the rest; more recently we have felicitated ourselves on the opening of a market in China capable of swallowing such goods to an

indefinite extent. Pray where are they to come from? Our present customers are evidently taking all that we have the raw materials to make; and as the high prices of 1853, 1857, 1859, and 1860 have palpably failed to influence any thing like a proportionate increase of supply, the present scarcity must for all practical purposes be considered absolute; *ergo*, all business in woollen and worsted goods to new customers must necessarily be so much abstracted from all the old ones! This is a most unwelcome conclusion to arrive at. To men of the world, having the word *progression* eternally on their lips, it sounds incredible, but who can gainsay it? Better ask, Where can we look for help? What we want is *more wool*, for which we can give a good price—fifty per cent. above what was considered profitable to grow it ten years ago! We might point to Canada as especially capable of assisting our growth of English, to South Africa for an increase of fine colonial, and to India for a larger supply of low wools; but if the stimulus for excessive price has proved insufficient to effect the desired purpose, we are at a loss for a stronger inducement."

Home Correspondence.

USES OF TEA.

Sir,—A single practical observation on tea-drinking may not be out of place. For twenty years I was in the habit of drinking black tea, at 3s. 8d. and 4s. the lb., but last year I thought I would try 5s. tea, and I have been delighted with the change. There seems to me to be no just comparison between the two teas. The 4s. tea appears to me to be a very uninteresting and suspicious kind of drug; the 5s. tea is a fine aromatic beverage. Moreover, practically, tea at 5s. is cheaper than tea at 4s., as three teaspoonfuls of the higher-priced will make a stronger and finer infusion than four teaspoonfuls of the lower-priced.

Very few of the large advertising tea-dealers keep 5s. tea; their best is usually 4s. 4d., a miserable article, compared with the 5s. tea. This good tea is to be had in some of the small, unpretending, old-fashioned shops.

I am certain that many will thank me for this hint if they will only make a trial. I see only one disadvantage, viz., that if all come to know that the high-priced teas are not only immeasurably the best, but actually the cheapest, the demand for them would become greater than the supply, and inferior teas would be offered as rare teas. It is therefore important to ascertain if an unlimited supply of the higher-priced teas could be imported.

I am, &c.,

GEORGE WYLD, M.D.

To Correspondents.

In the last number of the *Journal*, p. 147, col. 2, line 5, before "the malt-tax," insert "the repeal of."

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Royal Inst. General Meeting.
Entomological, 8.
Brit. Architects, 8.
Medical, 8½. Clinical Discussion.

Tues. ...Royal Inst., 3. Prof. Owen, "On Fishes."
Civil Engineers, 8. Continued discussion upon Mr. Braithwaite's paper "On the River Wandle."
Pathological, 8.
Photographic, 8. Anniversary.

Wed. ...Society of Arts, 8. Mr. George R. Burnell, "On the Condition of the Water Supply of London."
Geological, 8. Sir R. I. Murchison, F.R.S., and Mr. A. Geikie, "On the Altered Rocks of the Western and Central Highlands of Scotland."
Pharmaceutical, 8½.
Ethnological, 8½.

Thurs....Royal Inst., 3. Professor Tyndall, "On Electricity."
Zoological, 4.
Royal Soc. Club, 6.
Linnæan, 8. Mr. A. G. More, "On the Occurrence of *Festuca ambigua* in the Isle of Wight."
Chemical, 8. Prof. Field, "On the Carbonates of Copper, Nickel, and Cobalt."
Artists and Amateurs, 8.
Royal, 8½.
Antiquaries, 8½.

Fri. ......Astronomical, 3. Anniversary.
Royal Inst., 8. Professor T. H. Huxley, "On the Nature of the Earliest Stages of the Development of Animals."

Sat. .....Royal Inst., 3. Dr. E. Frankland, "On Inorganic Chemistry."
Royal Botanic, 3¾.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, January* 18*th*, 1861.]

Dated 7th January, 1861.

41. W. Taylor, Nursling, near Southampton—A portable horticultural and arboretical fruit, flower, and plant protector.
43. W. Bagley and W. Mincher, Birmingham—Certain imp. in coating metals and alloys of metal.

Dated 8th January, 1861.

45. W. Clark, 53, Chancery-lane—Imp. in filters. (A com.)
47. H. Hirsch, Bridge-road, Lambeth, Surrey—Imp. in insulating the conducting wires used for telegraphic purposes.
49. G. Hallett, 52, Broadwall, Lambeth, and J. Stenhouse, 17, Rodney-street, Pentonville—Imp. in the manufacture of pigments for coating surfaces.

Dated 9th January, 1861.

51. E. Lord and R. Whitaker, Todmorden, Yorkshire—Certain imp. in machinery for preparing, spinning, and doubling cotton and other fibrous substances.
57. C. S. Dawson, Thames Ditton, Surrey—Imp. in rotary engines, applicable to be worked by water, steam, or other fluids, also to be used as a means of raising and forcing fluids. (A com.)
59. W. E. Gedge, 11, Wellington-street, Strand—An improved buckle. (A com.)

[*From Gazette, January* 25*th*, 1861.]

Dated 13th November, 1860.

2784. L. Saccardo, Schio, Venetia—An improved apparatus and arrangement of paper for the substitution of this latter instead of the cards of Jacquard looms.
2786. W. Clark, 53, Chancery-lane—Imp. in looms. (A com.)

Dated 21st November, 1860.

2850. W. Clark, 53, Chancery-lane—Imp. in journal or axle boxes, for railway carriages, whereby to effect the better lubrication of the frictional surfaces. (A com.)

Dated 24th November, 1860.

2880. P. C. H. Charbol and A. Berson, 51, Rue de Malte, Paris—Imp. in the making of cages and aviaries for birds.

Dated 26th November, 1860.

2894. G. F. Train, Liverpool—Imp. applicable to street railway carriages, part of which are suitable for other purposes. (A com.)

Dated 3rd December, 1860.

2958. R. E. Keen, 15, Old Change, London—Imp. in cocks, taps, valves, and other apparatus for stopping and regulating the flow of liquids, steam, and gas.

Dated 18th December, 1860.

3104. C. Stevens, 1b, Welbeck-street, Cavendish-square—A new mode of obtaining an article resembling honey, and to be used as a substitute therefor. (A com.)
3108. W. Scholes, High Town, near Leeds, Yorkshire—Imp. in wire card-covering for carding wool, silk, flax, tow, cotton, jute, or other fibrous substances.

Dated 21st December, 1860.

3136. D. A. Morris, Pittsburgh, Pennsylvania, U.S.—Imp. in the manufacture of sheet iron.

Dated 24th December, 1860.

3154. P. Spence, Newton Heath, near Manchester—Imp. in separating copper from its ores.

Dated 29th December, 1860.

3188. J. L. St. Cyr, A. J. Grignon, and P. Rome, Paris—Imp. in manufacturing fibrous materials, tissues, or other fabrics.
3190. L. C. M. J. Vilcoq, Courbevoie, France—Imp. in apparatus or machinery for triturating textile bodies and other substances.
3192. H. Chamberlain, Wareham, Dorsetshire—Imp. in the preparation of clay for pottery purposes, which improvements are also applicable to filtering or cleansing liquids.

Dated 2nd January, 1861.

6. W. Cooke, Charing-cross—Imp. in apparatus for ventilating.

Dated 3rd January, 1861.

16. H. Doffegnies, Brussels—Imp. in the process for obtaining pulp for the manufacture of paper from Indian corn and other similar plants.

Dated 4th January, 1861.

22. P. Pimont, 55, Imperial-street, Rouen, France—Imp. in apparatus for dying fabrics and other articles.
24. J. Crocker, Liverpool—Improved apparatus for indicating the number of persons, vehicles, or articles passing, or being made to pass, any place or part of a machine, especially applicable to omnibuses.
26. J. R. A. Douglas, Hounslow, Middlesex—An improved mode of roughing the shoes of horses and other animals, to prevent them from slipping in frosty weather.

Dated 5th January, 1861.

30. A. Gilbee, 4, South-street, Finsbury—Imp. in sewing machines. (A com.)
32. G. Sloper, Hackney, Middlesex—An improved method of, and machinery for amalgamating, and for effecting the separation of gold from earthy and other matters containing the same.
34. L. D. Owen, 481, New Oxford-street—Imp. in bustles or skirt supporters. (A com.)
40. W. Luck, Mabledon-place, Burton-crescent, Middlesex—An improved table, or article of furniture.

Dated 7th January, 1861.

42. G. D. Mease, South Shields—Imp. in the manufacture of sulphuric acid, and also in separating copper and silver from their ores.
44. W. Bagley and W. Mincher, Birmingham—Certain imp. in coating metals and alloys of metals.

Dated 8th January, 1861.

50. J. J. Welch, Cheapside—Imp. in scarfs and cravats.

Dated 9th January, 1861.

52. D. Adamson, Newton Moor, Chester—Imp. in steam engines.
56. E. C. Shepard, Victoria-street, Westminster—An improved apparatus for carburating gas for gas lighting.

Dated 10th January, 1861.

62. S. Moulton, Bradford—Imp. in the manufacture of india-rubber, applicable to springs, valves for machinery, and other purposes.
63. R. A. Broom, 166, Fleet-street—Treating lava and other volcanic substances, in order to fit them for employment in certain arts and manufactures. (A com.)
64. C. Newsome, Coventry—Imp. in looms for weaving ribbons and other fabrics.
65. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in tanning hides and skins. (A com.)
66. J. Conry, Manchester—Imp. in apparatus for communicating between the passengers and guard and guard and engine-driver on railways.
67. C. H. G. Williams, 39, Regent-square, Gray's-inn-road—Imp. in the manufacture of dyes and colouring matters.
68. W. Longmaid, Inver, Galway, Ireland—Imp. in hardening the surfaces of the rails of railways, and the surfaces of the tyres of railway wheels, and in charring the surfaces of timber to be used for railway sleepers and other purposes.

Dated 11th January, 1861.

71. W. C. Corsan, Sheffield—Imp. in stoves, grates, or fire-places.
73. T. Bromwich, Bridgnorth—A combined apparatus for combing and cutting the hair of the human head.
75. W. H. Muntz, Millbrook, Hants—Improved means of signalling or communicating with the guard or engine-driver in railway trains.
77. W. E. Gedge, 11, Wellington-street, Strand—Imp. in weighing machines. (A com.)
79. T. T. Chellingworth, 12, Buckingham-street, Adelphi, and J. Thurlow, 37, Belvidere-road, Lambeth—Imp. in traction engines.
81. H. Pawson, 117, Leadenhall-street—Imp. in scale beams and weighing machines.
83. N. Ager, 77, Upper Ebury-street, Pimlico—Imp. in stoves and ranges.
85. W. G. Woodcock, West Bromwich, Staffordshire—Imp. in wrought iron beams or girders and columns.
87. M. A. Muir, and J. McIlwham, Glasgow—Imp. in looms for weaving.

Dated 12th January, 1861.

89. G. Whight, Ipswich—Imp. in sewing machines. (A com.)
91. J. Charlton, Manchester—Imp. in the method of directing the streams of water employed in extinguishing conflagrations, and in apparatus connected therewith.
95. E. F. Prentiss, Birkenhead—Improved apparatus for regulating the flow of gas, part of which is applicable to the valves of steam engines. (A com.)
97. C. A. Girard, 17, Boulevart du Temple, Paris—Imp. in preparing colouring matters for dyeing and printing. (Partly a com.)

Dated 14th January, 1861.

101. V. Hall, Oxford-street—Imp. in obtaining colouring matters.
103. H. Clifford, Greenwich—Imp. in apparatus to be employed in coiling and laying out electric telegraph cables. (Partly a com.)
105. H. Weaber, New Maldon, Surrey—An imp. in window fastenings.
107. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in machinery or apparatus for obtaining motive power. (A com.)

Dated 15th January, 1861.

109. J. Sidebottom, Harewood, near Mottram, Cheshire—Certain imp. in fire arms and ordnance.
111. J. F. Spencer, Newcastle-upon-Tyne—Imp. in steam engines, and the machinery and apparatus connected therewith.
113. C. B. Walker, 1a, Southampton-street, Strand—A novel mode of advertising, signalling, giving notices, or other communications.
115. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in the manufacture of blades for knives, razors, swords, bayonets, and other similar articles, and in apparatus to be used in such manufacture. (A com.)
117. M. Courniol, Libourne, France—Manufacturing tallow candles supporting a heat of 28 degrees, without greasing or adhering, and extracting from the moulds whatever may be the atmosphere every two hours.
119. L. A. Bigelow, High Holborn—Imp. in the construction of certain kinds of passenger carriages. (A com.)
121. E. Stevens, 5, 6, and 7, Cambridge-road, Bethnal-green—Imp. in machinery for preparing dough and paste.

Dated 16th January, 1861.

123. W. Coulter, 143, Everton-road, Chorlton-upon-Medlock, Manchester—An invention for the use of joiners, cabinet makers, and others, called a "bench hook."
125. J. Reading, Birmingham—Imp. in swivels or fastenings for connecting watches to watch chains, for fastening articles of jewellery, and for other like purposes.
127. J. Batley, Leeds—An improved manufacture of belting. (A com.)

PATENTS SEALED.

[*From Gazette, January 25th*, 1861.]

January 25th.

1813. J. Thompson.
1825. R. A. Brooman.
1841. J. H. Pape.
1843. L. Rome.
1852. A. V. Donnet.
1854. A. Dixon.
1856. J. Goucher.
1859. F. H. Trevithick and R. Jones.
1860. J. Willcock.
1872. J. C. Haddan.
1873. J. T. Pitman.
1874. B. Arnold.
1875. J. T. Pitman.
1880. S. S. Skipton.
1896. T. Webb.
1910. C. Stevens.
1911. C. Stevens.
1926. G. H. Newton and A. Wild.
1998. J. Garnett.
2098. C. J. B. Renault.
2173. P. Richards.
2191. D. Nicoll.
2351. W. A. Martin & J. Purdie.
2524. W. Ramsell.
2621. E. Sparkhall.
2848. G. H. Cail.
2886. J. H. Johnson.
2973. W. T. Walter and C Henij.

[*From Gazette, January 29th*, 1861.]

January 26th.

1829. J. Jeyes.

January 29th.

1865. A. Ripley.
1867. E. Partridge.
1877. E. Billington.
1999. R. Tempest and J. Tomlinson.
2025. J. Newhouse.
2105. J. H. Johnson.
2553. J. Jack and D. Rollo.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, January 25th*, 1861.]

January 21st.

122. W. Weild.
333. F. M. Baudoin.

January 22nd.

127. J. Gordon.

[*From Gazette, January 29th*, 1860.]

January 24th.

135. G. E. Dering.
149. J. W. Midgley.

January 25th.

136. J. Garnett.
152. P. Bussi.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

From Gazette, January 25th, 1861.]

January 21st.

162. J. Lockhart, jun.

[*From Gazette, January 29th*, 1860.]

January 25th.

241. P. J. Meeus.

January 26th.

212. J. L. Clark.

Journal of the Society of Arts.

FRIDAY, FEBRUARY 8, 1861.

DISTRICT MUSEUMS AND GALLERIES OF SCIENCE AND ART.

Upon the recommendation of the Committee to which this question was referred, the Council have passed the following resolutions:—

1. That the Society of Arts will promote the establishment and improvement of District Museums and Galleries throughout the United Kingdom, where objects of art and science may be exhibited, at times and under regulations which shall afford to all classes of the people the greatest advantages.

2. That the course of action of the Society shall be, to endeavour to bring District Museums into connection with this Society, the British Museum, the National Gallery, the South Kensington Museum, Kew Gardens, and other national institutions, and with private Societies, such as the Royal Horticultural, the Botanical, Zoological, Chemical, and Microscopical, with the view of establishing a systematic circulation of objects among District Museums; to endeavour likewise to promote contributions from public bodies and private individuals for the same purpose; to hold conferences from time to time when the subject may be discussed; to seek the assistance of Parliament when necessary; and generally to assist in promoting the objects in view.

3. That a General Committee be appointed to promote these objects, to consist of the Council of the Society, the representatives of all Institutions in Union and the promoters of district museums and galleries, with power to add to their number, and to appoint the necessary sub-committees.

4. That a General Meeting shall be held at the Society's Rooms, to which influential persons desirous of promoting the proposed objects shall be invited.

NINTH ORDINARY MEETING.

Wednesday, February 6, 1861.

The Ninth Ordinary Meeting of the One Hundred and Seventh Session, was held on Wednesday, the 6th inst., Sir Thomas Phillips, Chairman of the Council, in the chair.

The following gentlemen were proposed for election as members of the Society:—

Dixon, Thomas	Millgarth Mill, Dyer-street, Leeds.
Hughes, Richard Hugh	96, Hatton-garden, E.C.
Leach, George	Britannia Mills, Leeds.
Martin, John	Killyleagh Mills, Co. Down, and 29, Ann-street, Belfast.
Rein, Frederick Charles	108, Strand, W.C.
Reynolds, Wm. G. ...	20, Stratford-place, Camden-square, N.W.

The following candidates were balloted for and duly elected members of the Society:—

Brown, John	Rose-hill, Chesterfield.
Burzorjee, Dr.............	Northwick-lodge, St. John's-wood-road, N.W.
Crockford, Joshua	212, Euston-road, N.W.
Irvine, Robert	Black Hurlet, near Glasgow.
Scott, Sir Francis E., Bart.	Great Barr Hall, near Birmingham.
Tennant, Thomas M...	Newington Works, Edinburgh.
Walter, William Thos.	19, Long-acre, W.C.
Wilkinson, John	St. Helen's Mills, Leeds.
Wilson, George, jun....	West Hurlet, near Glasgow.

The following Institution has been taken into Union since the last announcement:—

Farnham, Young Men's Association.

The Paper read was—

ON THE PRESENT CONDITION OF THE WATER SUPPLY OF LONDON.

By George R. Burnell, C.E., F.G.S., F.S.A.

A few years since public attention was called, in a very prominent manner, to the numerous questions connected with the quality and the mode of distribution of water in the metropolis, and a very expensive parliamentary contest was waged between the advocates of the existing companies on the one side, and the General Board of Health on the other, which for a time clothed the whole subject with interest. After the excitement of the contest had passed away, the public interest seemed to have subsided; and, at the present day, the London population is contented to enjoy the advantages of the water supply it possesses, without much inquiry into the means and agencies employed in securing that blessing. Nevertheless the subject is one of sufficient importance to merit an occasional review; and as some very able persons connected with the administration of the laws affecting the public health have felt called upon to make what may be considered to be accusations against the quality of the London water supply, it has seemed to me desirable to bring about, if possible, an open discussion as to the merits and demerits of the present water supply, and as to the feasibility of some of the schemes proposed to remedy its defects. In some cases the operations of the Water Works Companies, subsequently to the passing of the Act of 1852, have also raised questions of the highest interest with respect to the subterranean geology of London, which I think merit more attention than they have yet received, and it will be my object briefly to allude to the conclusions fairly to be drawn from the facts observed with respect to them.

London, as you must all know, is built in the centre of a large basin of the tertiary formations composed mainly of stiff blue clays, underlying occasional patches of sands and gravels, and consisting at its base of permeable sand and mottled clays. The basement beds rest upon a depressed surface of chalk; and if, for the present, we limit our survey to the superficial geology, we find that around the lower margin of the chalk the subcretaceous formations outcrop in the valley of the Thames, to be succeeded by the oolites, and that none of the affluents of that river flow from any of the strata older than the oolites. All these formations, it is important to observe, are of more or less a moveable character, and their materials can easily be disturbed by heavy rains; moreover, nearly the whole of the surface of the vallies of the Thames and of its affluents is under cultivation, and is therefore the more susceptible of such disturbing actions. Lechlade, the first point where the navigation of the small head streams of the Thames commences, is situated at about 146 miles from London, and at an elevation of 258 feet above low water-mark of London-bridge. From thence the river, called in this part of its course the Isis, receives the Evenlode and the Charwell, flowing from the oolite and lias groups; then below Oxford it receives the Thame, also from the oolite and Oxford clay; the Windrush and

the Ock, from the chalk, or from the subcretaceous deposits; at Reading it receives the Kennet from the chalk; at Maidenhead, the Loddon, from the London clay; at Staines, the Colne, from the chalk; at Ham, the Wey, from the green sand under the chalk and the chalk itself; and shortly beyond the junction of the Mole, the tide is shut out by means of the Teddington locks. There are a few insignificant streams supplied to the Thames by the Bagshot sands, and, as we have seen, a few streams are derived from the lower green sands; but nearly all the affluents and the main stream are supplied by the formations which are likely to communicate to their waters the bicarbonate of lime; and from their high state of cultivation, and the number of inhabitants on their banks, it is fair to suppose that they also contain a rather large portion of organic matter. These remarks might be extended to the waters of the Lea and of the Ravensbourne, for they are both fed principally from the chalk springs of their respective vallies, and from the surface drainage of their water sheds, which are, as in the case of the valley of the Thames, highly cultivated. The only geological formations of a nature to supply pure, soft waters, in sufficient quantities for the consumption and the waste of a town like London, are situated at a very great distance from it. The Bala Lake, to which it has been proposed to resort, is, in fact, situated at about 170 miles, as the crow flies; nor are there any large bodies of water of a similar character to it to be met with nearer the metropolis, nor are any of the primary or plutonic rocks to be found within a reasonable distance.

In addition to the sources of water supply provided by the river and its affluents, the inhabitants of London were able formerly to derive a large quantity of water from shallow wells, sunk in the superficial gravels, or from deep wells sunk into the sand beds of the London clay, or into the subjacent chalk. For all municipal purposes, the wells in the gravel have long since become useless, and, both on the score of the quantity and of the quality of their waters, they may be here passed over, especially as the recent inquiries with respect to the effect of their waters upon the diffusion of the cholera, have raised so strong a feeling against their use, that no one would dare now to recommend those waters for any other purpose than for filling such pieces of ornamental water as the Serpentine, or St. James's-park. The deep wells in the basement bed still yield large quantities of water in some parts of London, and they are of great local value to manufacturers, but in other parts of the hydrographical basin of the metropolis, in consequence of the existence of a series of upheavals and displacements, the supply to the underground beds is so intercepted, and, at the same time, so great is the demand upon them, that, even in the most favourable places, they are gradually becoming exhausted. In the works of Messrs. Prestwich, Mylne, Braithwaite, Clutterbuck, &c., will be found a great mass of information on the subject of the gradual exhaustion of the subterranean water-bearing strata of London; and the permanent depression of the water-level in them has actually become an evil of serious practical magnitude to the factories which rely on this source of supply. It seems, however, that as much as 20 millions gallons per day are still drawn from the various wells about London, but now principally from the chalk. After the incessant rains we have had for the last eighteen months, it is possible that the level of the water in these wells may have risen, but the first drought will cause it again to fall, and every improvement which takes place in the land drainage of the exposed surfaces of the water-bearing strata, must tend to increase the exhaustion of their lower basin.

Although the exhaustion of the chalk, and of the basement bed of the London clay, has been thus markedly ascertained, it is curious that the Kent Waterworks Company should lately have succeeded in bringing to the surface a very large quantity of water by means of some wells sunk in the valley of the Ravensbourne, just before it falls into the Thames, and in the chalk itself. The yield of these wells is sufficiently great to enable the company to dispense almost entirely with its supplies from the Ravensbourne, and the water is bright, clear, and singularly wholesome and pleasant. It seems to me that the explanation of this anomalous flow of water is to be accounted for by the interference with the flow of the subterranean currents in the lower beds of the chalk—firstly, by the great line of fault which has given rise to the valleys of the Lea and of the Ravensbourne on the respective sides of the Thames; and, secondly, by the upheaval, in an east and west direction, which is known to exist between Windsor, Brentford, Deptford, Shooter's-hill, Grays, and the extreme north-westerly point of the embouchure of the Medway. In all probability, also, the same upheaval has thrown to the surface the spring which has lately been shown to exist on the north bank of the Thames, opposite to Gravesend; and I should be much disposed to believe that for many years to come large quantities of water would be obtainable from both the wells of the Kent Waterworks Company and from the newly-discovered spring, without producing any sensible depression of the water-line. At Woolwich, it is true, the Plumstead Company were obliged to sink, or to bore, to a maximum depth of 525 feet before it could obtain even a small supply; but their works were placed on the lower side, in the direction of the dip of the north and south fault of the Ravensbourne valley, and between the latter and the valley of Cray and Darent; so that the contributing area was forcedly a limited one, especially as the boring was not carried down to the more permeable and more highly-charged strata at the base of the chalk. I have heard of Artesian borings having lately been successfully made in the chalk in Bermondsey; and I have little doubt but that similar results would be obtained by sinking down to the chalk marl near the margins of any of the lines of fault already noticed; the effect of pumping liberally from such wells would, however, only be to exhaust the supply; and, in time, it would be found that the phenomena already observed in the upper chalk would be reproduced in the lower beds. It would be long, no doubt, before this effect would really take place; and in the meantime we may dwell with satisfaction on the discovery of the new sources of supply at Deptford and at Gray's.

The history of the wells in the Deptford valley is the more interesting from the fact of the failure of the attempt to secure a large supply of water from a deep well at Highgate, and it seems to me also to point a moral, which might be very useful to all connected with well-sinking. The Highgate well was commenced with the belief that by passing through the London clay and its subordinate beds, the chalk, the upper green sand, and the gault, a supply would be obtained from the lower green sand, in the same manner as at the Artesian well of Grenelle. It was known that the lower green sand outcropped on the margin of the gault all round the northern, western, and southern sides of the London basin; and certainly there was no *à priori* reason for doubting the continuity of the stratum beneath London. But after passing the various strata, including the gault, in the precise order anticipated, and of a total thickness of 1,113 feet 6 inches, the boring tools, instead of entering upon the lower green sand, as was then anticipated, passed into a series of beds of sands, sandstones, red clays, &c., which have been considered by geologists to belong to the new red sandstone series. From the results of some other borings recently made near London, I am disposed to believe that these beds are members of the Wealden series rather than of the new red sandstone, notwithstanding the apparent confirmation of the latter theory by the results of the borings at Calais, Ostend, and Harwich, to which I hope to be able to call your attention on a future occasion; but to whatever portion of the geological series they belong, the effect of their intrusion has been entirely to intercept the flow of the water of the lower green sand under London. Under such circumstances it was manifestly impossible that water

should be obtained at the Highgate well from that formation; and as the chalk, the chalk marl, and the upper green sand yielded comparatively no water, the prosecution of the works was abandoned. It may be added that the Hampstead Company, at whose expense they had been carried on, was shortly afterwards compelled to part with its district to the New River Company.

Now the lesson which may be learnt from this story seems to me to be, that there is little chance of finding water in any deep well, in formations like the chalk, if that well should be sunk in the intermediate zone between two great lines of fissures, such as have given rise to the outbursts of the springs in the vallies of the Colne and of the Lea; and it is to be observed that the indications of these lines of disturbance are to be traced on the south side of the Thames respectively in the vallies of the Wey and of the Ravensbourne. It would seem as though the subterranean waters accumulated near the edge of the fault, and were there forced to the surface, and it is worthy of notice that the springs which supply the four rivers above mentioned almost all rise on their western banks; that is to say, on the bank corresponding with the upper edge of the dip of the strata. In such cases the water might even be forced up a free open passage between the disrupted faces more easily than it would rise in a well sunk through the superincumbent strata; and a current once established in such a direction, a well sunk near the apex of the intermediate district, would not receive a larger supply than would arise from the precise area itself had laid bare. The water flowing in the intercepted stratum for a width equal to the dimensions of the well would flow into the latter, but no more; and the only way of increasing the yield of such a well would be by driving a heading across the line of dip, at the level of the water-bearing zone. This at least is certain, viz., that at Highgate and at Woolwich, the wells were sunk below the natural water line of the vallies of the Lea, or of the Ravensbourne, and no considerable volume of water was obtained in either of them.

Now to revert to the condition of the actual water supply of London, you must be aware that subsequently to the passing of the Metropolis Water Act of 1852, all the companies have been obliged to remove their sources of supply from positions where the waters were likely to be affected by the tidal action, or by the emanations of large manufacturing districts. The West Middlesex, Grand Junction, and Southwark Companies take their water from the same spot on the banks of the Thames, above the village of Hampton, and above the second lock on the navigation; the Lambeth and Chelsea Companies take their water from Kingston, above the Teddington lock; the East London and the New River Companies take their water from the Lea, the first from a lateral branch from the main stream given off above Clapton, and the latter from the river above Ware; whilst the North Kent Company takes its waters principally from its wells, and partially from the Ravensbourne. In all cases, the companies are bound to filter their waters, and the arrangements for that purpose are of the most elaborate description, and are, moreover, very conscientiously carried into effect. All the storeage reservoirs are covered, and in fact every precaution has been taken to ensure the purity and the good quality of the waters supplied to the inhabitants of London. Whatever can be effected by skill and science for those purposes has been done, and yet month after month the Registrar-General has thought it to be his duty to make comparisons between the water supplies of London and some other towns, which appear to lead to the conclusion that the London water companies supply a fluid of a very objectionable quality, even if they do not point to the necessity of a radical change of the whole system here adopted.

Without carrying you back into the Registrar-General's weekly returns of the public health, I would refer to those published at the beginning of October, November, and December last, in which the following tables appear:—

1860.	October.		November.		December.	
SUPPLY.	Total impurity per gallon.	Organic impurity per gallon.	Total.	Organic.	Total.	Organic.
Distilled Water	0·00	0·00	0·00	0·00	0·00	0·00
Loch Katrine, Glasgow ..	3·16	0·96	3·16	0·96	3.16	0·96
Manchester	4·32	0·64	4.32	0·64	4·32	0·64
Great Yarmouth...	20·96	3·04	...	...	...	...
Well, Great Titchfield-st....	...	...	140·68	16·68	...	...
" Bexley-st., Camberwell	...	...	...	...	214·00	12·80
Thames Companies.						
Chelsea	21·40	1·88	21·12	1·12	20·84	2·08
Lambeth	21·20	2·68	21·88	1·68	20·28	1·24
Southwark	20·40	1·12	19 64	1·08	21·60	1·80
West Middlesex	20·16	1·24	20·68	1·68	20.04	1·84
Grand Junction	20·28	0·84	20·96	1·36	21·88	1·60
Other Companies.						
East London	23·40	2·04	22·44	1·48	21 48	1·40
New River	20·08	1·12	20·32	1·12	22·30	0·84
Kent	24·64	1·60	23·78	2·68	22·40	0·56

Now, the value of official analyses of this description depends on the extreme care taken with them, and the precautions observed to secure correct results; yet we have this singular fact upon the face of the above table, viz., that the analyses of the supply from the Glasgow and from the Manchester Water Works for the three last winter months—during which heavy rains and snow fell, and the trees and shrubs upon the respective gathering grounds must have furnished a number of dead leaves able to affect the quantity of organic matter in the waters flowing from those grounds—the analyses have been identical. The comparison between the fixed quantity of organic matter assigned to the Glasgow and the Manchester water supplies on the one side, and the variable quantities asserted to be found in the London water supplies, goes for nothing under these circumstances. Again, in none of these cases has any public statement been made of the nature of the organic matter said to be contained in the waters, although it is universally admitted that the injurious effects of the organic matters in question depend upon the quantities of the nitrogenous elements they may contain in a state able to undergo decomposition. The nitrogen of the organic elements which have undergone decomposition is stated by Hofmann and Blyth to be innocuous, but in the tables above given it is included with the other "organic matters;" and it is by no means impossible that the actively dangerous elements may exist in the greatest proportions precisely in those waters which contain the smallest numerical quantities of the class here grouped under the same name. But be this as it may, it is worthy of especial remark that on several occasions the London waters have presented quantities of organic matters which are actually less than those permanently assigned to the waters considered to be "the types of wholesome town supplies."

As to the inorganic impurities in a town supply, there is still so great a variety of opinion as to their influence that it would be presumption in any one man, or even in any one body of professors, to pass a decided opinion on the subject. From the earliest periods to the present day it has been held by the most competent inquirers into this branch of pathology, such as Hippocrates, Chossat, Dupasquier, Levy, Dumas, &c., that waters containing a small quantity of the bi-carbonate of lime in solution are those which are the most advantageous for human consumption. It is precisely the bi-carbonate of lime which constitutes the bulk of the inorganic impurity of the waters flowing from the various formations of the valley of the Thames; and it appears, from the results of experiments on waters obtained directly from the chalk, that there is a larger proportion of that ingredient present in them than there is in the waters

originally derived from chalk springs, but which have flowed for some time in the open air. The wholesomeness of chalk water, when clear and free from mechanical impurities, is too well known to require more than a partial allusion; and it must, therefore, be a matter of surprise, to those who reason upon these matters, to find that the confidential advisers of the Central Administration should thus persistently dwell upon the amount of impurity in the waters supplied to London, when it is by no means proved that the so-called impurities are not positively advantageous under many conditions of a town supply. No details of the nature of the officially branded impurities of the London waters are given; but, from analogy, and from isolated experiments, it is fair to suppose that out of the 21.38 grains of impurity per gallon, there are, in addition to the average quantity of organic impurity, or 1.395 per gallon, about 16 grains of the carbonate of lime with variable proportions of the salts of potash, sodium, magnesia, and calcium. These inorganic substances may even be supposed to play some useful part in the strange chemistry of life; and it is notorious that the waters which do not contain them are often exposed to chemical reactions of a dangerous nature. Thus, for instance; in the case of the Woolwich and Plumstead Water Works Company, the very beautiful system invented by Dr. Clark for softening the chalk well water, was applied under the very able management of Mr. Homersham, and the impurity was reduced from 23 grains to seven grains per gallon. But, at the same time, it is to be observed, that the water so softened acted very rapidly indeed upon the lead cisterns, and services exposed to it; so much so I have been informed, as to entail a very heavy loss on the Water Works Company. Again, the waters of that "type of a town supply," Manchester, are now stated to be able—nay more, to be exposed—to take up lead in sufficient quantities to be deleterious to health; and the story of the lead poisoning of the family of the late ex-King of the French, through the use of a soft water which had been stored in a lead cistern, must be in the memory of all my hearers. I am myself disposed to suspect that there is some degree of exaggeration in the opinion held by those who have written on the deleterious action of soft waters on lead; but the point to which I am anxious to draw attention is this, that until the absolute importance of the actions of various classes of water are known, it is dangerous to cite any one of them as a type of a town water supply, and thus by implication to create a prejudice against other sources of supply. The fact is, that the human constitution is a far more delicate test of the value of a water for this particular purpose than any chemical analysis can be, and as the health of our London population is by no means inferior to that of the population of Manchester, or even of Glasgow or Aberdeen, whilst its moral habits are no better than those of the towns cited as having a more comparatively pure and soft water supply, it seems to me that there is something at least injudicious in the tone of the monthly criticisms upon the quality of the water distributed by the London Water Works.

There is, moreover, a very serious consideration which, to my mind at least, overrides the whole of this discussion of the quality of the London water supply, viz., that if medical and chemical authorities should agree that the present source of supply ought to be abandoned, there is positively no other source to which we could resort. The notion of forming gathering grounds and catchwater reservoirs, on Bagshot-heath, was too absurd for even the late General Board of Health to support, after it had been exposed to adverse criticisms for a few weeks. The scheme for collecting the waters from the Hind Head district also fell to the ground on examination; and I, myself, from personal inspection of the district, know that not only was the quantity of water said to be obtainable from it seriously exaggerated, but that the estimated expense of the works was as seriously below what it really would have been. Even if both these catchwater schemes for securing a soft water supply were executed at any cost, they could not furnish the quantity required for the enormous population of London. At the rate of the Liverpool and of the Manchester Water Works, where the rain-fall is greatly in excess of that of London, it would require gathering grounds in the proportion of about 25 acres per 100 individuals; or, for the supply of the metropolis, it would require not less than one thousand square miles, or about $\frac{1}{6}$th of the total estimated water shed of the Thames; and it is preposterous to suppose that under any conditions of springs fed from other sources the districts it has been proposed to resort to could yield anything approaching the volume which would be required. As it is, the abstraction of fresh water from the Thames is in dry seasons becoming an evil of serious magnitude to the navigation, even when the New River, the East London, and the Kent Water Works Companies derive their supplies from other sources than the Thames. What would be the case if the whole of the 100,000,000 millions of gallons now supposed to be consumed every day in London were withdrawn from the basin of the Upper Thames? It must, indeed, be observed, that if there be any real value in the opinion as to the hygienic superiority of the pure soft water, the whole of the town supply must be of that description, unless the new source be resorted to simply as the basis of a scheme in opposition to the companies already in possession of the supply. Far be it from me to pre-judge the question as to the necessity of any such opposition. All I seek at present to show is, that so far as regards the quality of the water supplied to London, there is no immediate reason for a change, and that there are as many objections to be raised to the qualities of the model municipal supplies as there are to the unjustly attacked waters distributed by the London water companies.

In the year 1856, a series of articles, under the head of "Visits to the London Water Works," appeared in the *Journal of Gas Lighting and Water Supply;* and in the same year a report to Mr. Cowper, President of the General Board of Health, was published, in both of which an account was given of the works executed by the Metropolitan Water Works, in compliance with the requirements of the Metropolis Water Act, 1852. At the date of the publication of those documents, nearly all that had been contemplated for the alteration and improvement of the existing system of supply had been completed, and since then little else has been done beyond the extension of the distribution into the continually extending suburbs of our marvellous agglomeration of houses, and some trifling modifications of the machinery required to meet the wants of some outlying districts. Perhaps the most remarkable events which have taken place since 1856, in the history of the London water supply, have been the completion of the works on the New River at Hornsey; the sinking of the new wells at the Kent Water Works; and the utter failure of the Woolwich and Plumstead Company, from a combination of circumstances into which it is not my province to enter. The results of the very costly, and very equivocally successful, experiments at Orange-street, and at Duck Island, have in no wise affected the question of the metropolitan water supply, and the schemes for supplying the extreme east of London from Grays, or the extreme south-east from the Cray, or the Darent, remain still in the state of projects; the Hampstead Company, as was before said, has been merged into the New River Company. At the present day, then, the companies which supply the metropolis are, 1. New River; 2. East London; 3. Southwark and Vauxhall; 4. Lambeth; 5. West Middlesex; 6. Chelsea; 7. Grand Junction; and 8. Kent. The capital embarked in these undertakings is enormous. From the returns to the General Board of Health, it seems that the total cost, up to 1856, had been not less than £7,102,823; and at the present day it cannot be much below $7\frac{1}{2}$ millions. In 1856, the aggregate nominal steam power employed was not less than 7,254 horses, and the quantity of water pumped was 81,025,842 gallons per day on the average of the year. Nor would it be unfair to sup-

pose that, in consequence of the increase of population since the date of these returns, that the present rate of supply must be nearly 100,000,000 gallons per day; or at the rate of about 40 gallons per head of the inhabitants. A service of this character cannot be lightly disturbed, and it behoves our rulers to observe especial caution in the manner in which they allow their agents to create feelings of dissatisfaction with a class of public contractors who have risked so much, and have laboured so earnestly, to discharge the duty they have undertaken. Perhaps the best proof of the earnestness with which the London companies have entered upon their task is to be found in the fact that they have spent no less than 2½ millions sterling for the removal of their sources of supply, for the filtration of their waters, and for the improvement of their distribution since the year 1852.

Before closing these remarks I cannot refrain from saying that the inhabitants of London have been very far from seconding either the intentions of the Legislature in passing the Act of 1852, or the Water Companies in their attempts to improve the quality of the supply. The legislature, unquestionably, intended (whether rightly or wrongly) to facilitate the introduction of the constant service, as it is called, into London; and the Companies have executed all the works incumbent upon them for that purpose. For my own part, I believe that the provisions in the Act of 1852 on this subject must always remain a dead letter; because the substitution of the machinery required for a distribution on the constant supply, for one upon the present intermittent supply, would involve an outlay on the part of the public equivalent to between £5 and £10 per house. Moreover, the waste of water upon the constant supply in a town like London—if it attained anything like the proportions it has done at New York and Boston—would instantly compel the adoption of measures to limit the rate of supply. Practically I believe that the distribution of water in London must continue to take place as it does at the present day; but so long as this is the case, so long does it behove the London public to exercise a rigid superintendence over the machinery of distribution which is under their own control. It is in vain to change the sources of supply for the purpose of avoiding orgainic impurity; it is useless to filter the water and store it in covered reservoirs, if, directly that water enters the houses it is intended to serve, it is poured into cisterns which are not cleaned out from year's end to year's end, or into butts teeming with every description of organic and inorganic impurities. In this matter, as in many others connected with social and hygienic science, the public requires to be taught that the remedy for the most pressing of their evils lies in their own hands, and if the householders of London would only clean out their cisterns once a month—at least once every three months—we should hear very little of the "total impurity per gallon" of the London waters. As it is, people who are not accustomed to think on these matters are apt to forget the real proportions of the impurity said to be present in those waters, and the public requires to be reminded that twenty-two grains per gallon only mean one grain in about 3,182 grains; and that 1·4 grains of organic impurity of all kinds only mean one grain in 50,000. If these impurities be poisons, they may be suspected to be slow poisons of the kind Fontenelle could, at the age of 80, afford to jest about, as he had taken them every day of his life, and we Londoners have an unfortunate habit "of persevering in living" under their effeets.

It may be worth while to add that the average cost of the London water supply does not exceed five per cent. on the rental, for a distribution so copious as to attain the rate of 40 gallons per head per day, or nearly seven times as much as it ought to be, for, in fact, no one really uses much more than six gallons per day. They only who take the water pay for it, and the trading companies who supply the public are obliged to suffer all risks, and to contribute very largely to all public burthens in the shape of rates and taxes; for instance, the assessments of the water companies to the poor rates vary between 9 and 32½ per cent. of their total rentals; and, moreover, they are by the very necessities of their position, compelled to adopt every improvement in mechanical or chemical science as it arises. A very long discussion might be raised upon this part of the political economy of the discharge of municipal services, but it may suffice here to say that the experience furnished by the management of the Manchester Gas Works, and of the Southampton Water Works, shows that wherever municipal bodies take upon themselves the discharge of functions which must be paid for in some way or other, there is a great danger; firstly, that there will be injustice in the assessment of the payment; and, secondly, that in the mode of working there may be extravagance, even if not abuse. The modern system of paying for the deficiencies in municipal budgets, occasioned by the inadequate charges for gas and water rents, by means of general and district rates, is, after all, only a disguised method of making the community at large pay a portion of the burthen the consumers alone should bear. The system adopted in London, where they only who receive a benefit pay for it, is certainly the fairest one, and, in the end, past experience has proved that is the cheapest.

The conclusions I am induced to draw from a careful study of the question of the present condition of the London water supply are as follows:—

1st. I think, that the quality of the water is on the whole extremely good, and that the Companies take every precaution in their power to maintain its character.

2nd. I am convinced that it is utterly impossible to secure a supply which should attain the supposed ideal type, even if that were desirable, which I do not believe.

3rd. I think that the greatest present improvement in the quality of the London waters would be effected by rendering it impossible for the population on the banks of the Upper Thames and its affluents to use the river as their outfall sewers. With all the local impurities thus cast into the Thames, the quantity of organic matters its waters contain do not, however, exceed in any notable quantity those contained in deep-seated chalk springs which cannot possibly receive sewage.

4th. It seems to me that any extension of our present supplies should be sought for rather on the east than on the west of London, and on the edges of some of the great lines of disturbance there existing.

5th. It seems also to me that it would be a mere waste of money to attempt to execute any system of catchwater supply.

6th and lastly. I think that there is both great injustice and great want of a true spirit of philosophy, in the insinuations which are now constantly urged by the Registrar-General on the subject of the impurity of the London waters. Pure water does not exist in nature, for even rain water contains appreciable quantities of ammonia; thus, Barral states shat the rain water of Paris contains about three in 100,000 of organic impurity; and the well of Grenelle yields a water containing about 15 in 100,000 of impurity of every kind; but even if pure water could be obtained, it would be necessary to ascertain the precise nature and effects of the extraneous matters, in any other definite water supply, before applying to those matters the term *impurities*. The Registrar-General's monthly reports, moreover, not being drawn up with the assistance of the officers of the Companies, can only be regarded as *ex-parte* statements, by one who evidently has a strong bias against the Companies or their sources of supply.

DISCUSSION.

MR. S. C. HOMERSHAM said he felt called upon to dispute some of the statements put forward in the paper as facts. To his great surprise, Mr. Burnell had stated that the Plumstead Waterworks Company was defunct. The Plumstead Waterworks Company was established in 1852, was opened in 1854, and had remained so till the

present day. They had never for an hour ceased to supply their customers, and they had an increasing number of customers every year since the works were opened. That was a fact which might easily have been ascertained by Mr. Burnell, and he would have found upon inquiry that the water of the company was now supplied to 3,400 houses. It was true that at one time there were disputes between the directors on the question of building the works upon leasehold ground, &c., and a Chancery suit and other legal proceedings had ensued in consequence; but that had never affected the water supply to the public. The well had been sunk in the first instance to yield 600,000 gallons per day, and as the tenants of the Company increased, in order to increase the supply, a bore-hole, 18 inches diameter, was put down, from which a further yield to the same extent, making 1,200,000 gallons per day, had been obtained. He was therefore much surprised at the statement in the paper that would lead them to believe the Plumstead Water Company had ceased to exist. Mr. Burnell had alluded to the softening process adopted by Dr. Clark, and stated that the water injuriously affected the lead service pipes. Now he (Mr. Homersham), as engineer of the Company, was enabled to state that the water did not act upon the lead in the least degree; that it was supplied to 3,400 houses, in almost every case through leaden pipes, and that he had never heard of any complaint, except in one case, in which the lead used for a cistern was of such bad quality, that the contractor, to save his own credit, had put up another tank at his own expense. He could therefore confidently state that in the case of the Plumstead water, there was no foundation for the statement that the water acted perniciously upon the leaden pipes and cisterns through which it was conducted and stored in the houses of the consumers. Pure, soft, spring water, free from organic matter, or free from carbonic acid, had no action upon lead; and such was the spring water supplied by the Plumstead Company. Dr. Clark, in his paper read before this Society in 1856, expressly stated that softened chalk spring water had no action upon lead. A series of tests upon such water had been made, which proved that the softened spring water had no action upon lead. With regard to the general water supply to London, Mr. Burnell had characterised it as very good; that chemists could only detect so small an amount of organic matter in the water that it was immaterial whether it existed or not. That statement accorded with the opinion given in 1849 by Sir William Clay, chairman of the Grand Junction Waterworks; but Mr. J. Simon, who presided over the meeting of this Society when Dr. Clark read his paper, showed the deleterious action which water containing organic impurities had upon the inhabitants of a large district of the metropolis, giving the facts taken from an authorised investigation into the subject after the last visit of the cholera.* That was a comparison, not between pure water and contaminated water of a district, but between waters more or less contaminated by town drainage; and yet chemists told them that such water contained next to nothing of organic matter. Therefore he considered these chemical tests as to organic matter in water went for very little. Microscopic examination showed that there were all sorts of animalculæ, and all sorts of impurity in the river water, whilst none at all existed in the spring water. One great objection to the water supply of the present companies was that the drainage of a large urban population was carried into the Thames, from whence the supply was taken. He believed there was a population of 700,000 upon that drainage ground. The water was also polluted by the manure put upon the land, and also by the barges going up and down the river, and various other influences. In addition to this, it was to be remarked, that river water in summer time was heated, whilst in winter it was excessively cold. The temperature of the rain-water in summer was sometimes as high or higher than 72 deg., and in the winter it was as low as 33 or 34 deg. Fahr. That was not desirable in a town supply of water, because the mere raising of the temperature of the water deprived it of a large portion of oxygen gas, and caused the fermentation of any fetid matter it might contain. On the other hand, the water froze very easily in the pipes in the winter. Now with regard to spring water it was taken from the well at 49 or 50 deg. of temperature in summer, and supplied at only 2 or 3 deg. higher temperature, whilst in winter it was only 2 or 3 deg. colder than when taken from the well. That, he considered, was an important circumstance, and especially in the matter of drainage. If they put water through the drains of houses at 51 or 52 deg. of temperature instead of at 72 deg., it was better for the sewage and for the health of the inhabitants. It had been stated in the paper that certain impurities in the water supply of London were pointed to in the registrar-general's returns, but that no analysis was given as to the quality of the water. Upon that point, however, they had the able analyses of Dr. Hassall. Mr. Burnell had advanced an opinion before this meeting that it was questionable whether they would get a better supply of water than they had at present. Now, he (Mr. Homersham) ventured to say that at a comparatively small expense, London might be supplied with 100 million gallons of spring water per day, containing only two or three degrees of hardness, and free from all unwholesome matter, and why had not this been done before? Simply because the government interfered between the consumers of water and the companies, and prevented a supply being brought into London from the chalk springs. The idea of a supply of water from the chalk was at one time ridiculed, but he might state that the Kent Water Company, seeing the success of the Plumstead works in 1854, with which Company they were in competition, had since sunk a well in the chalk, from which they obtained one a half million gallons per day, and had subsequently sunk two other wells, the three yielding three and a half million gallons per day, so that at the present time they derived all their supply from chalk wells, whereas a few years ago they had ridiculed the idea of getting a supply from the chalk springs. That was the effect of free competition. Mr. Burnell had alluded to the Trafalgar-square wells, as an instance in support of his assertion that the level of the water under London had gradually been lowered; but he (Mr. Homersham) would say that whilst it was true that the water in some of the large wells of London had been lowered, the Trafalgar-square well, which had been pumped from the last 18 or 19 years, stood just as it did formerly; and the same remark might be made as to the wells of the Kent Water Company and the Plumpstead Company, to which he had alluded, as well as very many others. He thought such statements were calculated to mislead the public as to the possibility of obtaining a supply of water for London from the chalk. He would undertake to find a contractor who, at a reasonable price, should furnish a practically unlimited supply of water from the chalk, free from impure organic matter, at a temperature of about 50 degrees, and soften this water to only two or three degrees of hardness. He (Mr. Homersham) had gone fully into the question of the quantity of water to be obtained from the chalk in his paper read before the Society on Feb. 2, 1852.*

Mr. J. T. Bateman, F.R.S., as the engineer of the Loch Katrine or Glasgow water works, and also of the Manchester water works, felt considerable interest in this subject. He was a great advocate for pure soft water. Mr. Burnell had alluded to the reports of the Registrar-General, and had remarked upon the uniformity of the analyses, during the months of October, November, and December, of the waters of Loch Katrine and the Manchester water works. He believed he could satisfactorily

* Vide Dr. Clark's Paper and Discussion thereon. *Society of Arts Journal*, vol. iv., p. 439.

* See *Society of Arts Journal*, Vol. 3, p. 168.

explain that circumstance. The analysis of the water of Loch Katrine was first made in 1854, at the time when a great outcry was made upon the subject of soft water supply, in consequence of the alleged action of such waters upon lead pipes. The water of Loch Katrine varied very little in quality in summer and winter, and it was generally regarded as the type of a good water supply. We was, therefore, anxious that old analyses of that water should not be relied upon, but that the test should be applied to the water as delivered in Glasgow after the works were completed. He therefore sent up a supply of the water from Glasgow from time to time, in order that analyses might be taken of the water as delivered for the use of the inhabitants of that city, and not of the water as taken directly from Loch Katrine. Samples of the water of Manchester were sent in a similar way at various times, at intervals of two or three months, and of that water analyses had also appeared. It made very little difference whether these analyses were repeated once a month or once in a year, for there was in point of fact very little variation indeed. He had the results of the analysis of the Manchester water, made in 1844, by Professors Miller, Penny, and Redwood, from which it was shown that there were 3·6 grains of total impurity per gallon, 1 grain of organic impurity, and 1½ degree of hardness in the water supplied to Manchester, and the analyses since that time varied very little, as would be seen by those referred to by Mr. Burnell. The water of Loch Katrine was received into immense basins, 700 or 800 feet in depth, and the vast body of water thus collected might be conceived from the fact that during the late most severe weather, when Loch Vennachar was completely frozen over, as well as the lower part of Loch Lomond, the temperature of the air being 12 or 14 deg. below zero, there was not an atom of ice on Loch Katrine, and the water, after travelling through the bowels of the earth for a distance of 27 miles to the service reservoir near Glasgow, gained 2 deg. of temperature, and was delivered at the end of the tunnel at 41 deg. of temperature in the coldest weather; in fact, all along the line of aqueduct, warm air was emitted from the shafts of the tunnels, and the vapour there condensed like steam from a locomotive engine all along the hills under which the water travelled. In the case of Manchester, the water was, for the most part, taken direct from the springs, without being stored in reservoirs, which were only resorted to in the event of a short supply. The daily supply of pure spring water at the Manchester Waterworks varied from six or seven million gallons to thirty millions. The supply to the city might be taken at eleven million gallons per day, ten-elevenths of which were spring water. That accounted for the uniformity in the quality of the water there. Mr. Burnell had made some remarks upon the desirability of the presence of bi-carbonate of lime in the water; that was supporting the old theory, that it was necessary to drink hard water for the production of bone in the human frame. Now, he would remark, as the result of his personal observation, that the finest men in Great Britain were those who lived in districts where no hard water could be obtained; there they had the largest-boned specimens of human beings. In Aberdeen and the east coast of Scotland, and in the granite districts generally, they had no bi-carbonate of lime in their water, and finer men he had never seen, and the same remark equally applied to the lowlands of Scotland, about Melrose, and to the Cumberland and Westmoreland Lake districts. There they had no hard water at all. In Wiltshire and Dorsetshire, which were chalk or lime districts, they found perhaps the smallest-boned specimens of humanity that were to be met with all over the country. He believed it was better, on all accounts, to have soft water without any lime. Another consideration with regard to hard water was its cost. He had on a recent occasion gone into a calculation of the saving which was effected to Glasgow from being supplied with soft water. The water of the Clyde, from which the supply was previously taken, contained from seven to nine degrees of hardness, and since the supply of soft water had been furnished there was a saving in large printing and bleaching establishments of fully one half in the article of soap alone. In fact, in some cases the saving had been equal to five-eighths, for since the water of Loch Katrine had been supplied, it had been found that three boxes of soap were equal to eight boxes formerly, and the work was done better with the diminished quantity. In fact, the saving from all causes from the use of soft water, was £40,000 a year, and paid the water-rates of that portion of the city in which the change had taken place. It was equal to a free gift to the city of £1,000,000. In the case of London, a supply of similarly soft water, taking into account the greater hardness of the present supply, would be equal to a free gift to the City of £10,000,000 sterling. With regard to the action of soft water upon lead, an investigation, of a very complete and expensive character, into that matter had been made at Glasgow. When the main difficulties in the supply of water from the loch were got over, they were astonished to find that some samples of water were produced before the parliamentary committee, as showing the effects of the action of soft water upon leaden pipes. The town of Inverness had been for 27 years, at that time, supplied with water from Loch Ness through services of lead and wood cisterns with an intermittent supply, and yet no case of lead disease had ever been heard of; and he had had in his possession, for the last seven years, portions of pipes which were beautifully coated with bicarbonate of lime, carbonate of lead, or some other substance of that kind, which perfectly protected the water from any injurious effects of the lead. To take another case, Whitehaven was formerly supplied with hard water, which was changed for a soft water supply from Ennerdale Lake. The mortality returns for four years previous to the introduction of soft water showed an average of 35 deaths per thousand, whilst upon a supply of soft water being furnished to that town, the average of the following four years showed that the mortality was reduced to 23 in the thousand. Amongst other subjects alluded to in the paper was that of the management of those matters by corporations, and Mr. Burnell had referred to two cases especially, viz.:—the Manchester Gas Works, and the Southampton Water Works. Now the former, so far from being an example of bad management, was one of the most lucrative concerns ever adopted by a public body. It was an arrangement by which the township of Manchester had established its own gas works, and, while supplying excellent gas, had gained a sufficient amount of profit to be enabled to expend more than half a million of money in the public improvements of the town; and in the case of Glasgow he might add that the results of carrying out the same system of management by a corporation, had been the improvement of the navigation of the Clyde from a depth of 3 feet and annual dues amounting to £300, to 22 feet depth and a revenue of upwards of £90,000 per annum.

Mr. Lott said that Mr. Burnell had reproached the public of London with apathy upon the matter of the water supply. There was something more than apathy—there was disgust felt at that legislation which had given rise to the present monopoly of the water supply, and which enabled the existing water companies to increase their charges fifteen per cent., a power they were not slow to avail themselves of. It was a public misfortune that the splendid legacy bequeathed by Sir Hugh Myddelton to his fellow-citizens had led to the formation of a private company, whose profits were almost fabulous, whilst it held despotic sway over the water supply in the district. The remark had been made that the Camden-town Water-works Company had been compelled to merge their concern into that of the New River Company. The plain history of that matter was, that when the Camden Town Company had a short supply of water, they applied to the New River Company for assistance

and the latter made it a condition of their assistance that the former should give up some of their districts, until gradually the Camden Town were compelled to give up district after district, until the New River Company got all the streets into their own hands. He was, however, happy to say that in his place in the Corporation he was the means of arresting for a time the death-struggles of the Hampstead Water Company, inasmuch as upon their applying to the Corporation for a renewal of their lease of some lands at Highgate, which were the property of the Corporation, from which they obtained their supply, the payment of a very large sum was fixed by the surveyor as the condition of the renewal; but feeling sympathy for the Company in its misfortunes, and being a decided opponent to monopoly, he succeeded in inducing the Corporation to grant a renewal of the lease upon terms that were almost nominal. In 1835 a great question was raised with regard both to the quantity and quality of the supply of the New River Company, and having employed a chemist to make an analysis of the water, he brought the matter before the attention of the Corporation. Some of the governors of the company attended before the Corporation on that occasion, and the result was a considerable improvement both in the quantity and quality of the water. That was the way they were obliged to watch these companies. He would say one word with regard to municipal bodies failing in the management of these matters. It was too much the fashion in the present day to abuse these corporations. For his own part he would say he very much regretted that the Corporation of London had not taken the matter of water supply into their own hands. If there was a profit to be made out of it he believed they would have been as successful in that respect as the Corporation of Manchester had been in the case of gas, and the profits so made would have gone in aid of the public rates.

Professor Tennant inquired of Mr. Bateman from what formation the water of Manchester was principally obtained.

Mr. Bateman replied from the millstone grit.

Mr. Spencer understood Mr. Bateman to state that the profits from the Manchester water supply went in aid of the gas supply of the same town.

Mr. Bateman replied that the case was just the reverse. Half the profits of the gas went in reduction of the water rates. The present water rate was sixpence in the pound, supplemented by half the profits from the gas.

Mr. Spencer would add, with regard to the action of soft water upon lead, that during the time he was engaged at Glasgow in the investigation of that question, he visited Whitehaven, which was distinguished by having softer water than almost any other town in the kingdom, and he could state, as the result of the investigation by some of the most eminent chemists of the day, that no perceptible action had taken place upon the lead pipes there. In that case, the water was below one degree of hardness. Some time subsequent to that, he was called upon to make an examination as to the corrosion of water pipes, and supposing it to be a case analogous to that of Whitehaven, he procured some pieces of the lead pipes. He would, in the first instance, state that the water was very soft, and corroded the iron main pipes to such an extent that the delivery of six-inch pipes was reduced to the quantity that would be given through three-inch pipes, owing to the extent to which corrosion and deposit had gone on, and in some portions of the town the supply was partially stopped. But on examining the leaden pipes, he found there was a very beautiful coating of carbonate of iron in the interior; hence, if it had not been for the action of the water upon the iron piping, there was no doubt there would have been corrosion of the lead. The report upon the subject was that the health of the inhabitants had been saved at the expense of the iron pipes. He did not say that they ought not to have to gone to Loch Katrine for their water,—he thought it was the best thing they could do; but he said, until the pipes became coated in the way he had described, with some deposit from the water, the water of Loch Katrine was calculated to have an action upon the lead.

Mr. Fred. Braithwaite remarked that the question of water supply to the metropolis was a very serious one, and might with propriety be discussed before this Society; at the same time he thought they ought to be careful how they disturbed the minds of so vast a population as to the quantity and quality of the water with which they were supplied at the present time. It must be admitted that the great source of supply at this moment was from the river Thames. The Government, some years ago, very carefully investigated this question, and insisted upon the various water companies taking their supply from the river beyond Teddington-lock, where it was as free as possible from contamination; and if they looked at the water which was now supplied they would find that they had water quite sufficiently pure. It was stated upon analysis to contain a certain number of grains of impurity per gallon —carbonate of lime being considered an impurity. Hypothetically distilled water only was pure, and one grain of carbonate of lime might thus be called an impurity; but could this be considered really an impurity? A gallon of water contained 70,000 grains, and analysis had shown that one-and-a-half grain, or at most two grains of organic impurity existed in that number of grains. He was, therefore, anxious that they should not create in the public mind an alarm that at the present time the supply of water to London was of a nature injurious to health. It was true that the water alluded to by Mr. Homersham, derived from chalk-springs, was of a very soft character, with an absence of organic matter which was found in other water, but in that case Dr. Clark's system was employed to precipitate the carbonate of lime; such a plan, however, he thought was impracticable in a commercial sense, and he would ask Mr. Homersham whether the result was commercially profitable in the case of the Plumstead Waterworks?

Mr. Homersham replied, that the net profits of the company amounted to £3,700 last year.

Mr. Braithwaite was, nevertheless, inclined to doubt the commercial success of the undertaking. The great question was, was there any town in the kingdom supplied with so large a quantity of water, of such purity, and at such a price, as London? The supply was estimated at 40 gallons per head daily, a far greater quantity than was fairly required. He had no hesitation in saying that if last summer they had had a season of dry weather, like that of the previous year, London would not have had the supply of water it required, for they had scarcely a gallon of water flowing over Teddington Lock during the summer of 1859. During the last year they had a more abundant supply, the rainfall having been about 12 inches beyond the average. They had now abundance of water in the Thames above the lock, and the river had not been in a better condition for the last thirty years than it was at the present time.

Mr. Wm. Hawes said that, judging from the papers which had lately been read before the Society, he had expected to see the walls of the room covered with diagrams representing the fearful amount of pollution infecting the water supply of London, with microscopic illustrations of that pollution, tending to show that the inhabitants of London, in addition to injury from adulterated food, were liable to be poisoned with the polluted water which they were obliged to drink. This discussion had shown that, notwithstanding all the alleged impurity of the water of London, the amount of the impurity was so infinitesimally small that they might go on drinking it without undue alarm as to any injurious effects upon their health. It was important that exaggerated statements should not be put forward. They had been told that in districts where this fine soft water was alone drank the finest specimens of humanity were to be met with. That might be quite true in the abstract; but on the other hand if they went to those countries where only the purest (so called)

water, the snow water, was drunk, as in Switzerland, they found the most diseased population perhaps in all Europe, who were characterised by the great prevalence of goître amongst them. Isolated cases were not to be relied upon. He thought they might undoubtedly appeal to the general health of the city of London as the best proof that they were on the whole well-supplied with what they ate and drank. They were told that the charges for water supply in London were exorbitant—those of the New River Company in particular. If they took the West End of London, for example, he believed the average rate of charge was from four to five guineas per annum for such houses as were found in the squares north of Oxford-street. He thought that could not be called an enormous charge for water. The New River Company was commenced very many years ago, when London was comparatively small in extent, and the demand for water had gone on rapidly increasing. The supply, as far as the New River Company was concerned, was at one time limited, but now the case was different, and the accumulated profits of the undertaking had put the original shareholders into a position to make very large profits upon the early nominal capital. They were told that the corporations of Glasgow and Manchester were types of perfection in these matters of supply of gas and water, but did they wish to have the supply of the necessaries of life placed in the hands of corporations? Was the corporation the power to which they would wish to entrust the supply of this great city with those necessary commodities? He contended that the best means of supplying a great city like London was through the agency of great public companies and commercial firms, under the vigilant eye of the public. That was, in his opinion, the best as well as the cheapest way of getting a supply of those articles which every large city required.

Dr. Wyld remarked that it had been advanced by some speakers that evening that they could not have a better supply of water for London than that which was derived from the Thames. He could only state that during a residence last summer at Kingston, he found the water of the Thames opposite that town in a most offensive state. He quite agreed with the recommendation given by Mr. Burnell, to look to the state of their cisterns. As a matter of personal experience he could state that, having been without water at his residence for some time during the late frost, the opportunity was taken to inspect the state of the cistern in his kitchen, when there was found to be at the bottom an inch in thickness of foul slimy matter. This showed the importance of having the cistern periodically cleaned.

Mr. A. S. Harrison was able to state, from his personal experience as a practical plumber in the City of London, that very great negligence prevailed with regard to the cleansing of the cisterns; and instances were of very frequent occurrence in which large quantities of filthy matter had been suffered to accumulate at the bottoms of tanks. The deposit itself resembled lime mixed with a yellow-coloured matter, and he concluded that it consisted principally of the lime deposited from the water, coloured by the rust of the iron pipes through which it passed. He had taken up some miles of pipes in the City, and he invariably found that they were covered with a thin coating, which he presumed was lime, which was easily removable with the finger, but which the passage of the water itself was not able to remove. With regard to leaden cisterns he believed that injury frequently arose from a galvanic action taking place between the lead and the solder connecting the bottom and sides of the cistern, as it was at those parts that any failure usually took place. With regard to the supply of water to London, he was in favour of constant service and supply through meter. In Billingsgate Market and other places where very large quantities of water were used, that system had been adopted with satisfactory results both to the consumers and to the companies supplying the water.

The Chairman, in asking the permission of the meeting to present to Mr. Burnell their thanks for his paper, would offer only one or two remarks. The discussions of this Society, useful as they were, were sometimes of a somewhat discursive character, and certainly they had had that evening topics which were not quite pertinent to the subject before them. Mr. Bateman, in a very interesting description of the water supply of Glasgow and Manchester, had sought to claim the large and sinewy frames of some of his Scotch friends as the products of soft water, whilst he had pointed to the feeble and degenerate growth of some of our Southern people as the unfortunate results of hard water. If the paper which had been read that evening painted in too favourable colours the water supply of the metropolis, the reverse of the picture had been offered to them by Mr. Homersham and other speakers, in terms not over flattering to the Water Companies. Much of the value of these meetings of the Society arose from the freedom of discussion which prevailed in this room, and that corrections which exaggerated statements were thus sure to receive. Notwithstanding all they had heard, he hoped the audience would go away with no great amount of discomfort from the fear that they would not have a sufficient supply of good water for their use during the year 1861. He must confess he went very far with Mr. Hawes in the distaste that gentleman had expressed against too much interference in these matters on the part of municipal bodies. The great characteristic of the English people was, that they relied upon themselves, and if they did not get everything absolutely perfect, they had the satisfaction of knowing that in providing for their wants by their own independent agency, those habits of self-reliance were formed by which as a nation we were especially characterised. He was therefore sure he should have the unanimous sanction of the meeting to a vote of thanks to Mr. Burnell for his paper.

A vote of thanks to Mr. Burnell was then passed.

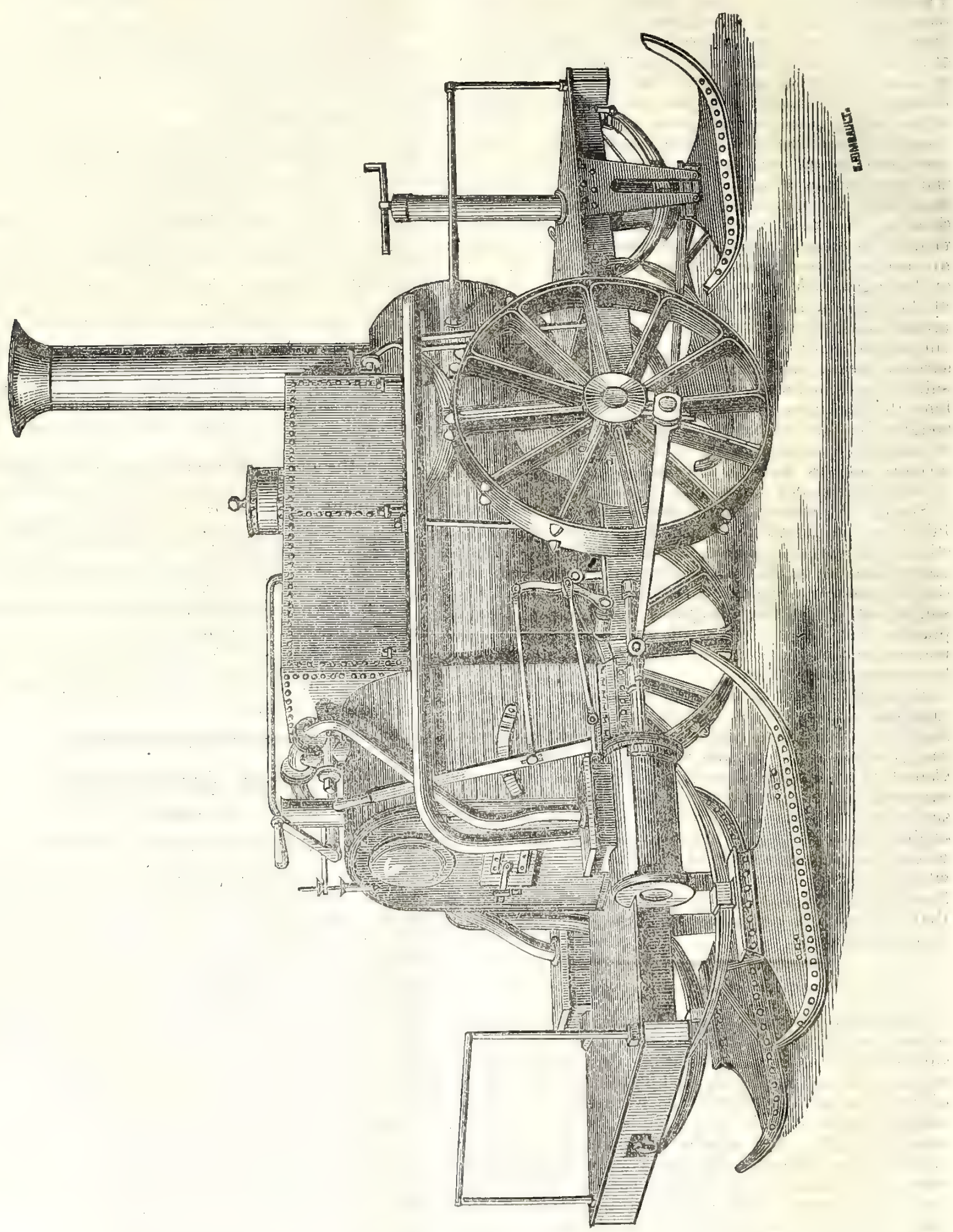
The Secretary announced that on Wednesday evening next, the 13th inst., a paper "On the Uses of Tea in the Animal Economy," by Dr. Edward Smith, F.R.S., would be read.

ICE LOCOMOTIVE.

The ice locomotive, shown in the accompanying sketch has been constructed from the designs, and under the superintendence, of Mr. Nathaniel Grew, Assoc. Inst. C.E., F.R.S., and has been lately sent out by Mr. Edw. Corey, of New Broad-street, to M. Gabriel Solodovnikoff, of Moscow, who has the exclusive concession for the use of such machines in Russia. It is intended to be used on the frozen rivers and inland lakes for the transport of tallow and other goods from the interior, during the long winter season, this duty being at present performed by horses and other beasts of burden, at a very slow and expensive rate.

The machine consists of a frame of plate-iron, similar in construction to the ordinary railway locomotive framing, bu made as light as is consistent with the requisite strength. This frame, with the boiler cylinders and tank attached, is carried upon a pair of driving-wheels, four feet n diameter, and on four sledges, two at the front of the machine and two behind, the weight being mainly disposed upon the driving wheels, to give them the utmost amount of tractive power possible; to aid in this, and to increase the grip of the wheels on the ice, steel spokes are furnished with the machine, and can, if necessary, be screwed into the tyres of the driving-wheels, on the same principle that a horse's shoes are "roughed" on a slippery winter's day. As little as possible of the weight is borne by the leading sledges, to facilitate steering the engine in its passage over rough or uneven parts of the ice; and to effect this, the cylinders are fixed to the frames behind the driving-wheels, or at the fire-box end of the boiler. The cylinders are six in. diameter, with a stroke of piston of

16 inches, and are firmly bolted to the outsides of the frames, and give motion to the wheels through a connecting rod working on a crank pin fixed in the wheel centres. The outside cylinder "system" has been adopted, to enable a straight driving angle to be used, and avoid the expensive and easily broken double crank shaft. The engines are fitted complete, with expansion links' reversing motion, feed pumps, &c., similar in character to locomotive work, the whole being made as strong as possible with a due regard to weight. Steam is supplied to the cylinders from an ordinary tubular boiler with fire-box; the latter is made large in proportion, to enable wood



to be used as fuel; for the same purpose the tubes are fewer in number and larger in diameter than are usually applied where coke or coal can be procured. The working steam pressure is intended to be 100 lbs. on the square inch. The feed water supply is maintained from a tank saddled on the barrel of the boiler, this tank being intended to be filled with snow and ice when travelling in a region where water is a solid. To convert the ice into water, a steam jet is applied from the boiler. The capacity of the tank is about 100 gallons.

To enable the machine to be guided whilst moving, an apparatus for the purpose is fixed to the leading sledges. On the foot-plate in front of the engine, an upright tube or column is fixed, carrying with it a spindle capable of being

moved from above by means of a cross handle; to the lower end of this handle is fixed a pinion, gearing into a segment of a wrought-iron wheel, fixed to the sledges, but so arranged as to leave the carrying springs independent; thus, on the handle above being turned, motion within certain limits is given to the leading sledges, and the machine receives its proper direction when travelling. The trailing sledges are fixed firmly to the springs, and have a vertical play in horn-plates, which are bolted to the frame. The sledges are constructed of T-iron, of a section of $2\frac{1}{2} \times 3$ in.; the sides of plate iron, and they are stiffened by diagonal stays of angle iron. The springs on the driving wheels are also capable of adjustment for the distribution of the weight of the machine, and considerable play is allowed to the driving axle vertically in the frame, to enable the wheels to accommodate themselves readily to the holes and irregularities of the ice surface. The feed pumps are fixed inside the frames, and are worked from the eccentric sheaves. Hooks are fixed at each end of the frame, for attaching the sledges conveying the goods, &c., in a similar manner to the waggons of a railway train. On the arrival of the engine at Moscow, it is intended to fix at each end of the engine a house, of light but warm construction, as a protection for the engine-driver and conductor from the effects of the severe temperature. All parts of the radiating surfaces, steam pipes, &c., will be also thickly clothed with suitable non-conducting material. With a view to combine the maximum of strength with the minimum of weight, the machine has been constructed without the use of cast iron, excepting for the cylinders, wheel centres, and eccentric sheaves, the remainder of the work being wholly of wrought iron and gun metal.

Should the present engine prove moderately successful, it is the intention of the designer to construct a still more powerful engine, having a pair of wheels of larger diameter at the back of the fire-box, and the cylinder in front of the engine, which will be supported upon a single pair of guiding sledges, it having been found in practise that the six points of support are difficult of management in the event of the wheels getting into a hole or on a ridge of ice.

Some preliminary trials of the engine have been made upon the ice between St. Petersburgh and Cronstadt, the results of which have been on the whole satisfactory—a run of seven miles out and home having been obtained. Considerable difficulties were met with (as was to be expected) in the first starting of the machine, the excessively low temperature converting all water about the engine into solid ice. Filling up the feed-pumps, even when in steam, were amongst some of the inconveniences to which the experiments were exposed. Some idea may be formed of the intensity of the cold, when it is mentioned that the exhaust steam fell from the chimney top in a shower of snow.

THE BOOK TRADE.

The annual statement of the Board of Trade shows that in the year 1859, 6,520 cwt. of books were imported into this country from abroad—for at our Custom-house books are weighed, not numbered—and 33,543 cwt. of our books, of the declared value of £478,198, were exported from this country, besides 372 cwt. of foreign books, of the declared value of £5,201. Our exports, therefore, were five times as large as our imports. Of the books imported a third came from France; of the books exported a third went to the United States; a still larger proportion to our colonies; only 537 cwt. to France. The duty on the books imported (valued at £14 a cwt.) amounted to £5,295; but the duty then was 30s. a cwt., except on books of and from our colonies, or admitted under treaties of international copyright, both of which latter classes paid and pay only 15s.; but by Mr. Gladstone's tariff of 1860 the duty on unprivileged books imported from abroad, in all languages, is now reduced from 30s. to 16s. a cwt. Old books, printed before 1801, come in free of duty.

ROCK OIL.

The following letter has been addressed to the editor of the *Times*:—

Sir,—In November, 1859, in the State of Pennsylvania, wells were sunk for the purpose of pumping petroleum, or rock oil, and it has been vigorously continued up to this time, many of the wells producing from 10 to 50 barrels of oil a-day, and some even more.

In July, 1860, in the State of Ohio, 50 miles from this city, oil was discovered, and in the short time elapsed more than 50 wells have been put in successful operation, yielding from 10 to 60 barrels, and at this time hundreds of wells are being put down.

This oil is being refined for illuminating purposes, for which it is excellent, surpassing in brilliancy the best sperm oil, or any other article for light known on this continent, at the same time being half the price of sperm.

The oil, in a crude state, is an excellent lubricator, and many of our railroads use it, as well as other departments requiring a friction oil. The production bids fair to be very great, but the demand exceeds the supply, and the amount of money invested is now large, and is being increased daily. I notice in Sir Charles Lyell's *Principles of Geology*, 248 and 250, that the petroleum springs are mentioned, the most important of which are found in the Burman empire, near the city of Ava, a fact but little known, except to geologists and scientific men, and the simple announcement made and the reference* leave an anxious inquiry in the minds of inquiring men.

From the quantity spoken of there—viz., 400,000 hhds., it is inferred that it is appropriated to a good use, and that it is valuable as an article of commerce.

Can you, through your wide-spread journal, give in brief the origin, character, and uses of the Burman oil, how procured, quantity, and its utility as an article of use and its importance in commerce?

I will, at some future time, give you a fuller and more extended description of this branch of our commerce, and other matters of interest relating to its production, use, and probable adaptation to the wants of man.

Truly yours, HORACE WILKINS.

Cleveland, Ohio, Jan. 1.

Home Correspondence.

ADULTERATION OF FOOD.

Sir,—In the course of the discussion on Wednesday evening, after Mr. Scott had delivered his valuable paper on the adulteration of food, Dr. Riddell is reported to have said, "with regard to cayenne pepper, the public taste was in favour of a red-coloured article, although it was difficult to conceive how a genuine pepper of that colour could be furnished from a dark brown, or yellow chili." From this observation I am led to infer that Dr. Riddell is of opinion that genuine cayenne pepper ought to be brown or yellow, and that the red colour is imparted to it by the addition of brick dust, red lead, or some other deleterious substance, in deference to the public taste. If I am right in supposing this to be his opinion, I beg respectfully to inform him that he is labouring under a mistake; genuine cayenne pepper ought to be neither brown nor yellow, but red; and not red from the addition of brick dust, or any other foreign material,—but from the natural colour of the substance of which it is made. There is a great variety of capsicums, or chili peppers,—some large, some small,—some green, some yellow,—and some red. The best is that which is the most pungent, and the most aromatic, which is the small bird pepper. This pepper, when ripe, is in colour a bright vermilion,

* *Syme's Embassy to Ava*, vol. ii.; *Geol. Trans.*, second series, part iii., page 788.

and resembles in size and shape the seed of the hawthorn. The best cayenne pepper, both as regards flavour and pungency, is made of the bird pepper when it is perfectly ripe. It is in colour a light red. It would be a darker red if the husk or rind were only used; but the seeds being ground up along with it—and they are the most pungent part—and those seeds being yellow, the powder is not nearly of so brilliant a red as the integument of the fruit. I send you, for the inspection of Dr. Riddell, a small bottle of genuine cayenne pepper, and I assure that gentleman that it contains neither brick dust, red lead, nor any other foreign material whatever,—but is solely and exclusively pulverised bird peppers, gathered when ripe, and dried in the sun. If peppers are dried in an oven, as they sometimes are, they lose their aroma, and their colour is impaired. Very frequently cayenne pepper is made of green, unripe capsicums. I need not say that such pepper is very inferior in pungency and flavour. I know as a fact, that the greater part of the Jamaica cayenne pepper is adulterated, not here, but in the island itself. It is made of all kinds of capsicums, large and small, ripe and unripe. Its colour is generally a dirty drab, but a fine crimson hue is given to it by the addition of the farinaceous covering of the seed, and the pollen of the flower of the annotta (*Bixa orellana*). This also adds to its substance. But cayenne pepper adulterated with the farina of the annotta, will not keep long, for the flour becomes sour and musty, and is liable to cake if it becomes damp.

In reading the remarks made by the various speakers who took a part in the discussion on Wednesday evening, I was, I confess, surprised at the dissatisfaction expressed by some of them at the statements of Mr. Scott, and I was still more surprised at the observations of the chairman, who characterised those statements as exaggerations. Mr. Scott is worthy of all praise for exposing the tricks of fraudulent traders, who, to enhance their own profits, do not scruple to administer poison by wholesale to the people. From the style in which some of the speakers animadverted upon his revelations, one would suppose that the adulteration of food was a new question, that Mr. Scott had preferred charges before unheard of, and that the persons whom he denounced were much injured individuals, quite incapable of committing the acts which he attributed to them. But this is no new question. The charges are not now brought for the first time. Not many months ago a Committee of the House of Commons made a searching inquiry into this very subject, and they recorded a mass of evidence which more than confirmed all that Mr. Scott stated in his able and valuable paper. That committee elicited facts which made one's hair stand up on end, and one's blood run cold. Those facts convinced us, to our horror, that not a banquet did we sit down to which Cæsar Borgia might not have prepared; that not a festive board was spread, which did not—*ab ovo usque ad mala*,—support viands mixed with poisonous ingredients.

Nearly a hundred years ago the extensive adulteration of food, the unwholesomeness of the London water, and the filthy practices of the metropolitan dealers, were brought under the notice of the public by Dr. Smollett, a man of wit and imagination—but a man also of great learning and observation. He delivers himself through the medium of one of his own characters—Matthew Bramble, of Brambleton Hall. The sturdy and choleric Welshman expresses himself with much bitterness, but with not less truth. Speaking of the London water, he says: "If I would drink water, I must quaff the mawkish contents of an open aqueduct, exposed to all manner of defilement, or swallow that which comes down the Thames, impregnated with the filth of London and Westminster. Human excrement is the least offensive part of the concrete, which is composed of all the drugs, minerals, and poisons, used in mechanics and manufactures, enriched with the putrifying carcases of beasts and men, and mixed with the scourings of all the wash-tubs, kennels, and common sewers within the bills of mortality." Speaking of wine, he says:—"As to the intoxicating potion sold for wine, it is a vile, unpalatable, and pernicious sophistication, balderdashed with cyder, corn spirit, and the juice of sloes. In an action at law against a carman for having staved a cask of port, it appeared from the evidence of the cooper, that there were not above five gallons of real wine in the whole pipe, which held above a hundred,—and even that had been brewed and adulterated by the merchant at Oporto." Of bread, "the bread I eat in London is a deleterious paste, mixed up with chalk, alum, and bone ashes, insipid to the taste, and destructive to the constitution." Of veal, "the same monstrous depravity appears in their veal, which is bleached by repeated bleeding, and other villanous arts, till there is not a drop of juice left in the body, and the poor animal is paralytic before it dies, so void of all taste, nourishment, and flavour, that a man might dine as comfortably on a white fricassee of kid skin gloves, or chip hats from Leghorn." Of vegetables, "perhaps you will hardly believe that they can be so mad as to boil their greens with brass halfpence, so as to improve their colour, and yet nothing is more true." Of pork and poultry—"As for the pork, it is an abominable carnivorous animal, fed with horse-flesh and distillers' grains; and the poultry is all rotten, in consequence of a fever occasioned by the infamous practice of sewing up the gut, that they may be the sooner fattened in coops, in consequence of this cruel retention." Of oysters—"The right Colchester are kept in stone pots, occasionally overflowed by the sea, and the green colour so much admired by the voluptuaries of this metropolis, is occasioned by the vitriolic scum which rises on the surface of the stagnant and stinking water." Of fruit—"It was but yesterday I saw a dirty barrow huxter in the street, cleaning her dusty fruit with her own spittle, and who knows but some fine lady in St. James's parish might admit into her delicate mouth those very cherries which had been rolled and moistened between the filthy, and perhaps ulcerated chops of a St. Giles's huckster." I will conclude with his description of milk—"But the milk should not pass unanalysed; the produce of faded cabbage leaves and sour draff, lowered with hot water, frothed with brewed snails, carried through the streets in open pails, exposed to foul rinsings discharged from doors and windows, spittle, tobacco quids from foot passengers, overflowings from mud-carts, spatterings from coachwheels, dirt and trash chucked into it by roguish boys for the joke's sake, the spewings of infants who have slobbered in the tin measure, which is thrown back in that condition among the milk for the benefit of the next consumer; and, finally, the vermin that drops from the rags of the nasty drab that vends this precious mixture, under the respectable denomination of milkmaid."

These are not very savoury descriptions of the articles of common consumption in the days of Smollet; and if they be correct, we cannot wonder at the Welsh Squire pining for his goat's whey, and his mountain mutton. Whether such abominable practices as those above mentioned are now in vogue, I am not able to determine; but we have it on incontestable evidence, that there is scarcely an article of diet at the present time, which is not more or less poisoned; and I feel assured that at whatever table we may choose to dine, drink tea, or sup—unless we are prepared like Mithridates, King of Pontus, by being accustomed to every description of poison, so that none can take effect upon us—we drive a nail into our coffin by every morsel we eat, and we take a shovelful of earth out of our grave by every drop we drink.

I am, &c.,

R. TEMPLE.

Sir,—The subject of the adulteration of common articles of consumption seems to me so important, that the Council of the Society of Arts ought immediately to take some steps to meet the evil, and I would beg leave to suggest the easiest mode of doing so.

Let some person be engaged—no better man than Mr. W. L. Scott could be chosen—to write a small treatise, pointing out the most usual and important sophistications and the readiest mode of detecting them. The subject need not be farther extended than to the adulteration of bread, milk, butter, tea, coffee, pepper, pickles, preserved fruits, sugar, sweetmeats, and vinegar; and also some simple tests should be described for discovering copper, lead, arsenic, and sulphuric acid in any article. At the same time there should be published a box containing suitable tests and apparatus for performing the required analyses. The treatise ought not to exceed 1s. in price, and the box of tests £1. Of course, analyses so performed by unaccustomed hands could only give a rough result, insufficient to convict a tradesman; but when a buyer has thus convinced himself of the adulteration of any article, he could either pursue the subject further, by taking it to a professed analyst, and so obtain legal evidence of the sophistication, or change his tradesman till he finds the vendor of a pure article. Many adulterations are so easily discovered by very ordinary skill, that, with the assistance I have suggested, I make no doubt that many persons would be able to perform the necessary analyses, and possibly, remonstrance with the vendors might often be sufficient to remedy the evil.

Having been engaged several years in the administration of the Poor Laws and in visiting pauper schools, my attention has been frequently called to the adulterated articles furnished to the poor in workhouses. I have often remarked the superior health of the children in those pauper schools where cows are kept and bread is made in the house, *i.e.*, as I infer, where the children are fed with these important ingredients of their dietary in a pure state.

I think there can be no doubt that such a pamphlet and box of tests as I have suggested would meet with an enormous sale. I am, &c.,

E. CARLETON TUFNELL.

Sir,—I wish to say a few words on the adulteration of green tea, cocoa, and milk.

A patient of mine finds green tea the best remedy for occasional nervous headaches, but in searching for green tea, out of some ten shops, where he purchased samples, he found only one genuine. The proof was a very simple one. In nine of the cases the green colour was washed off by the infusion; in one only the leaves remained of a greenish hue after the infusion.

What is called "Homœopathic Cocoa" is a very inferior article to that sold ten years ago. Most samples of this cocoa are now adulterated with probably not less than from 30 to 50 per cent. of farinaceous materials. Genuine cocoa is only to be had by those who purchase the nibs. From the recent excellent papers on cocoa which appeared in your journal, it seems that the best cocoa never comes to this country. I have very great faith in cocoa as an article of diet, and I believe it has never been fully appreciated in this country; and I feel convinced that if any one with capital and energy entered upon the wholesale and retail business of cocoa seller, he would, if he acted with perfect honesty, and supplied the public with only the very best cocoa, realise in London a large fortune.

Water is almost the only adulteration of milk, and is easily detected, thus:—Get a "test tube," about 10 inches long, fill it with milk, and let it stand for 36 hours. If there is water present it will all sink to the bottom of the test tube. The cream will float on the top, and in 10 inches of good milk there shoud be about one inch of cream. Ten quarts of milk produce one quart of cream. This is sold for 4s.; the remaining skim-milk is sold to small dealers at 2d. a quart; this is, in poor districts, diluted with water, and sold to the poor for 3d. a quart! Almost all the milk supplied to London is produced by cows kept in stables in town, and consumption is a common disease with such cows.

Finally, if legislation is required with regard to the supply and quality of our food, no branch of food industry requires it more than the milk trade, as milk is the most universally used, and the most universally applicable from infancy to old age, of all kinds of food.

I am, &c.,

GEO. WYLD, M.D.

TEA.

Sir,—I have read with much pleasure the interesting paper by Mr. L. Wray, and think the time very opportune for directing public attention to so large an article of consumption as tea; there can be no possible doubt that the tea which reaches this country has by no means the aroma and fragrance of the tea used in China, as well as in Russia.

The Russians boast of the good tea they get, although they certainly pay a much higher price for theirs than we pay for the usual tea sold retail to consumers here in England; the tea that reaches St. Petersburg is brought from China overland, or by the excellent Russian system of river navigation, and seems to retain its peculiar perfume and taste to a high degree. It is said that the cause of the flatness and small perfume of the teas used in England, is accounted for by the long sea-voyage it endures, and that the mode of packing is not effectual in retaining the most refreshing qualities of the tea. On entering a room in Russia where tea is being made, one is met by a light, fragrant, aromatic perfume, that is most refreshing; the infusion (generally drunk with sugar and a slice of lemon, without milk) is also invigorating and comforting to the system. The English little know the pleasure they lose in the flat insipid tea they generally drink, and, could they but taste it in its perfection of flavour, would soon set aside such teas as have lately been forced into consumption.

The Russians are as particular in their teas as we are in our wines, and will give an extravagant price for a really fine specimen. I was offered tea, at a beautiful establishment in Moscow, at 50s. per pound, and so much is it cared for, that elegant and costly silk and satin covered boxes are prepared to contain choice sorts, as presents for friends. I am, &c.,

G. N. H.

Sir,—On the misunderstood, and consequently misrepresented subject of tea adulterations, allow me to offer a few remarks. They shall be as condensed as possible. Being myself quite certain that but a very small proportion of the teas imported into this country are in any way adulterated, I desire, through the medium of your valuable journal, to lay before the public, as simply and briefly as may be, a few of the many facts which might be advanced, and which may, perhaps, best illustrate the grounds of my own conviction in this matter. As I wish to address solely the uninitiated but vitally interested consumers of the article in question, I will endeavour to avoid all Chinese and scientific technicalities, and speak merely from careful observation and long practical experience in the English markets. What I would show, then, is that tea not only is not, but cannot be, adulterated, supposing the commercial principle to rule, viz.,—"that the object of production is profit."

To meet any queries and doubts that already exist or may arise, it may at once be admitted that there have been and are small consignments which may be truly called adulterated or imitation teas occasionally arriving from Canton. These consist of such rubbish as may become mixed with the sweepings of the Canton packing warehouses; certain and sundry teas, damaged during land or junk transit in China, &c., together with such odds and ends as accumulate from time to time at the said port, and are there broken down by mills into dust; rolled into large shot-like particles, by means of a preparation of gum or starch, and coloured and scented as

either Canton gunpowders or capers; but these occasional adaptations and imitations, however, only serve to prove the result of a false economy, wrongly based on the maxim of gathering up the fragments; since such consignments have seldom if ever paid, when brought here, the bare expenses of manufacture and transit. The same has been the ultimate fate of all other grades, of whatever kinds, which have really been of the class of spurious sorts, as on such parcels, even when they have sold at a profit on first arrival, profit has never resulted to the purchaser, but invariably a fearful loss. No sort of leaf is so abundant in the tea districts of China as the leaf of the genuine tea plant, and as any other leaf (even there, where the means of manufacture are at hand) would entail as much or more trouble and expense in the gathering and preparation, where or in what can exist the motive for substitution? I altogether pass over the absurd supposition that tea leaves already infused are collected and re-dried; the process of collection, purification from consequent mustiness, &c., and re-manipulation, would be more difficult and expensive than the preparation and first cost in China of the finest crop of tea ever produced. For these simple reasons I would therefore humbly submit that teas as imported are not open to the charge or suspicion of having been largely adulterated.

On the second point it is not attempted to be denied that the different grades of tea are mixed together in China at the packing ports to make up chops* for price, but this practice requires great experience and care on the part of the blenders. Teas of a similar leaf and class, though perhaps a lower grade in quality, can only be so mixed, inasmuch as really common congou mixed with the finer kinds in any proportion would lower the quality, and consequently the money value of a chop of good or fine tea many pence per lb.; much less, then, can any spurious substance be so used with impunity. As well might the wine importer make the insane attempt to reduce the cost of his wines by the admixture of water. Tea, however, in this particular is much more sensitive than wine.

The following instances in my own knowledge will illustrate this point, as serving to show that the manipulated leaf is so exceedingly susceptible of the least taint or contamination that it cannot be profitably tampered with:—A parcel of "Fine oolong" (about 200 half-chests) was placed in a London bonded warehouse. From its superior quality it was very soon purchased by a London wholesale dealer, who, on account of the good condition of the packages, ordered them not to be inspected†; the leads of only a few sampled ones were therefore cut. After a very short time (warm weather setting in), on drawing trade samples something peculiar was detected in this parcel of tea; the quality being superfine and the price high, the sales and clearances were slow. At length positive complaints came from the dealers who had the most recently had packages of the said tea out of bond; the tea was right in class and leaf, according to the first-drawn samples, and the packages in the best condition (*i.e.* not sea-damaged or otherwise injured), but something was now the matter with this tea which nobody could understand. On arriving at this conclusion the packages remaining in bond were laid down for inspection, and on cutting the leads, one single half-chest which, on the first removal from the ship had been placed somewhere about the middle of the stack pile of the 200 packages, was found to contain the remains of three or four Chinese mice, which had been in a state of putrefaction, the effect of which seemingly trifling circumstance I have already detailed.

* A chop of tea means all there is of the particular parcel (for the shipment or season) of that particular make and quality, and consists of black teas, say 600 chests, and of green teas from 30 to 300 half-chests.

† Every package of the different chops is generally inspected on arrival, and as a further proof of the great vigilance exercised by the hands through which they pass in China, it is but seldom that any even trifling variations occur in the quality of even the largest chops.

Again, some three or four seasons since, a similar series of circumstances, as to quality, condition, and subsequent complaints happened to a chop of the finest Kaisow congou. In this instance the whole of the tea had been carefully inspected immediately on its arrival, and passed as in perfect condition, except from sea damages, &c. This tea, being new season's, of the finest quality, was at once in general demand, and a great many chests were quickly cleared for consumption, the recipients widely differing in their opinions;—praises and condemnations, good orders and countermands, arriving with contradicting perplexity from town dealers and from all parts of the country. In this case, after a more minute examination of tea and package chest by chest, it was discovered that about one-sixth of this chop was packed in chests partly made of "Sassafras wood," and although some of such packages contained only a strip of the said wood, yet all the tea in every such chest was so impregnated with the peculiar spicy scent of that most aromatic shrub, that not only was the decoction from this thus tainted tea peculiar in flavour, but almost undrinkable. Had this accident of wrong wood having been used by the package-makers in China, remained long undiscovered, the whole of this valuable chop of tea would have become comparatively worthless, as some of the packages not actually containing any of the objectionable wood had already imbibed the contagion.

It may here occur to the thoughts of some who are unacquainted with the peculiar property of tea to so readily absorb any foreign odour, that the two cases mentioned apply to the finest and consequently to the most delicate descriptions only, but the concluding fact, which I beg to cite, will, it is hoped, fully answer any such query.

A very mixed cargo or consignment of teas consisting of all grades, from low to medium and fine, was some years since deposited in a bonded warehouse at Hull; and every pound of every chest that remained there for any number of weeks became strongly tainted with the flavour of oranges, quantities of which were stored in the floors below. Moreover it may here be added that drug and even sugar ships are useless in the China ports for tea shipments, as all such vessels would do great damage to a cargo of tea.

Official statistics, &c., I must altogether omit, or I fear too much of your space would be taken up; these with hints to the consumer, &c., shall follow if needs be. What I now have endeavoured to impress on the public mind is,—that tea as an article of commerce is, in all its grades of quality and modes of preparation, so susceptible of the slightest contamination, that it cannot be adulterated with impunity and profit; that it is in fact the "true sensitive plant," and will (so long as it remains a daily necessity of our nation) be its own exciseman.—I am, &c.,

W. G. REYNOLDS.

Feb. 2, 1861.

Proceedings of Institutions.

Brompton (near Chatham) Church of England Young Men's Society.—The tenth annual report speaks of the success of the Institution during the past year. During the session, lectures were delivered as follows:—B. Shaw, Esq., late Fellow of Trinity College, Cambridge, "A Suit in Chancery;" Captain Scott, R.E., "The Dial Plate of the Heavens;" Captain Scott, R.E., "The Chemistry of the Kitchen;" the Rev. H. Gurney, "Proverbs—their Wit and Wisdom;" J. Defraine, Esq., "How to get on in the World;" J. Defraine, Esq., "Our Young Men and Women;" J. Anderson, Esq., "The Properties of the Atmosphere;" Lieut.-Col. Rowlandson, "India, and the Sepoy Mutiny;" the Rev. J. B. Owen, "Old-School Affectations in Literature, &c.;" the Rev. R. Maguire, "The Construction of a Watch;" and Capt. Scott, R.N., "Recollections of the South Seas." The expenses

necessarily incurred in providing these lectures exceeded the receipts; indeed, the pecuniary returns on these occasions are stated to be very uncertain. The Monday evening meetings on Biblical and Secular subjects continue to be appreciated. The results of the Examination of the Society of Arts, in May last, were highly satisfactory—six of the members having obtained certificates. What has been achieved on this first effort will, it is hoped, stimulate the successful candidates to greater exertion, and also encourage others to present themselves at the Examination of 1861. The thanks of the Committee are due to those gentlemen who constitute the "Local Board," for their valuable aid in conducting the "Preliminary Examinations," and in carrying out the regulations of the Society at the "Final Examination." The Committee gratefully acknowledge the valuable services of those gentlemen who have kindly lectured gratuitously during the past year. The Serial department of the Society continues to fulfil its mission, by supplying weekly, at the homes of the members, the best periodicals of the day —no less than 5,980 changes having been made during the year. The library now numbers 600 volumes. The Committee wish to record their grateful sense of the untiring zeal evinced by the late Honorary Secretary, Mr. J. Newlyn, in the cause of the Society. The income of the Society during the past year has been £83 15s. 7d.; the expenditure, £83 13s. 11d., leaving a balance in the treasurer's hands of 1s. 8d.

CARLISLE, CHURCH OF ENGLAND INSTITUTION.—The first lecture of the season, in connection with this Association, was delivered on the 30th October last, in the Athenæum, by the Worshipful Chancellor Burton, President of the Association. G. H. Head, Esq., occupied the chair; and there were also on the platform the Venerable Archdeacon Jackson, Rev. W. Belt, &c. The Chancellor's subject was "Archbishop Cranmer."—A vote of thanks was accorded to the Chancellor, who, in reply, said he was at all times willing to do whatever lay in his power for the benefit of the Institution. The CHAIRMAN alluded to the various excellent features which distinguished the Institution—a valuable library, a reading room, and classes in which different branches of learning were taught gratuitously by competent masters. They were also in union with the Society of Arts; and a number of their young people had taken part in the examination of that Society held in May last—the result being, he was delighted to say, that out of 14 competitors, no fewer than 11 had obtained certificates—and these certificates he would now present to the young gentlemen who had won them.—The Chairman then called upon each of the prizemen separately and presented him with his certificate. In conclusion he said that the duty he had discharged was a pleasing one to him. It was a good sign of the times, and he hoped the young men would continue to pursue their studies with energy and vigour. Their knowledge would promote their comfort and happiness in passing through life—it would enable them better to discharge their duties to themselves and to society—and would tend to make the evening of their life calm and peaceful. He wished them God speed in their onward course.—A vote of thanks was passed to the gentlemen who conduct the classes.—The Rev. W. BELL, chairman of the committee who preside over the classes, responded. His own class was one of the smallest, but the subject, Latin and Roman history, was not so popular as some others. However, he was happy to say that his class—and, indeed, all the classes—had very considerably increased in numbers; and from what had been done during the late year to further the work of education by means of these classes, they had every reason to look forward to next year for still better results. For his own part he should be extremely happy—and he could speak as confidently for the other gentlemen—to give his very best efforts towards forwarding that work, which was, to his mind, so intimately associated with the prosperity of the Institution. A vote of thanks to the Chairman brought the proceedings to a close.

LOCKWOOD, MECHANICS' INSTITUTE.—The annual meeting was held on the 30th of January, Mr. Chas. Kaye in the chair. He said he was glad to meet the members once more, and to see such a good attendance. He regretted that they had not a new Mechanics' Hall to meet in, as had been anticipated, but this was not the fault of the committee, who had taken the necessary preliminaries in the matter, but it was owing to the difficulties met with by the collectors amongst those who had been solicited for subscriptions. He believed these difficulties would speedily be removed, and he hoped to see, before another year, a building suitable for a Mechanics' Institution. He then called upon Mr. Lee, the secretary, to read the report, from which it appeared that the number of male members was 169, besides 50 female members. The library contained 585 volumes, 50 having been added during the past year, and the issue had been 1917, about the same number as the previous year. The cash account showed that the receipts during the year had been £133 15s. 9d., and the balance at the commencement of the year was £4 8s. 9d., making a total of £138 4s. 6d. The expenditure had been £135 8s. 5½d., and the balance in the treasurer's hands was £2 16s. 0½d. The following gentlemen were elected to serve on the committee for 1861:—Captain Bentley Shaw, President; Mr. Spencer Beaumont, Treasurer; Rev. T. B. Bensted, M.A., Rev. Jno. Barker, Messrs. T. Haigh, J. Brierley, J. Kettlewell, S. Lodge, J. M. Spedding, J. Kenworthy, S. Ogden, F. W. Armitage, S. Black, H. Taylor, C. Kaye, B. Armitage, J. Dow, T. Tate, N. Berry, and J. Smart.

PORTSEA, WATT INSTITUTE.—On Monday evening, the 14th instant, the annual *soirée* in connexion with this Institution took place at the Queen's Rooms, Lion-terrace, and the promises held out by the Committee were more than realised. A. Murray, Esq., the President of the Watt Institute, occupied the chair. The platform was most tastefully decorated, and the room was crowded to excess. Mrs. Donnison (teacher of music) kindly presided at the pianoforte, and performed various selections of music. She was accompanied in several of the pieces by Mr. Coller, on the flute. The vocal department was sustained by Miss Nowell, Mr. Budden, Mr. Madge, and Mr. Croxall and Mrs. Donnison. The band performed at intervals during the evening. Refreshments were supplied on the most liberal scale. Several recitations were well given, especially one by Mr. Caldwell—"Eugene Aram's Dream." The entertainment concluded with the amusing dialogue of "Box and Cox," the character of Cox being sustained by Mr. Barnes. A vote of thanks was passed to the Committee for their successful exertions, as also to Mr. Murray for presiding.

MEETINGS FOR THE ENSUING WEEK.

MON. ...Discussion on the Papers read at the last Meeting, viz.:— 1. "The North Atlantic Telegraph," by Capt. Sir F. L. McClintock and Allen Young, Dr. Rae, Mr. Tayler, and Col. Shaffner. 2. Mr. Macdouall Stuart, "Further details relative to the discoveries in Central Australia."
Medical, 8½.
TUES. ...Syro-Egyptian 7½. Rev. John Mills, "Account of a recent visit made to Mounts Gerizim and Ebal."
Civil Engineers, 8. Continued discussion upon Mr. Braithwaite's paper "On the River Wandle."
Medical and Chirurg., 8½.
Zoological, 9.
WED. ...Literary Fund, 3.
Society of Arts, 8. Dr. Edward Smith, "On the Uses o Tea in the Animal Economy."
Graphic, 8.
Microscopical, 8. Anniversary.
Roy. Soc. Literature, 8½.
Archæological Assoc., 8½.
THURS...Royal Soc. Club, 6.
Philological, 8.
Royal, 8½.
Antiquaries, 8½.
FRI. ..... London Inst., 1. Anniversary.
Royal Inst., 8.
SAT. .....Asiatic, 3. Mr. Redhouse, "On the Turkish Bath, and the characteristics which distinguish it from the Roman Bath."

PATENT LAW AMENDMENT ACT.

[*From Gazette, February 1st*, 1861.]

Dated 5th November, 1860.

2708. E. F. Prentiss, Philadelphia, U.S.—A new detergent.

Dated 24th November, 1860.

2809. S. M. Fox, New York, U.S.—Imp. in rails for railways, and in the wheels to run thereon, especially adapted to street railways.

Dated 10th December, 1860.

3031. W. E. Newton, 66, Chancery-lane—Imp. in machinery for "quartering" cork-wood, and for cutting the quarters into bottle corks. (A com.)

Dated 3rd January, 1861.

18. S. Perkes, Clapham, Surrey—Imp. in presses and modes of pressing, applicable to cotton, hemp, wool, coir, hides, hay, fibres, peat, linen, thread, piece goods, extracting oil, and other useful purposes.

Dated 8th January, 1861.

46. W. Rattray, Aberdeen—Imp. in preserving organic substances.

Dated 11th January, 1861.

72. H. T. Hooper, Killiow Kea, Truro, and W. Gerrans, Tregony, Cornwall—An improved machine for distributing manure on lands.
74. W. H. Muntz, Millbrook, Hants—Imp. in breaks for locomotive engines.
80. W. H. Moran, Cologne—Imp. in gas meters.
82. A. Réne le Mire Normandy, Odin-lodge, King's-road, Clapham-park—Imp. in connecting gas and other pipes.
86. R. Smellie, West Merrieston, Lanark, N.B.—Imp. in apparatus for supporting and working sash windows and other similar sliding or traversing details.

Dated 12th January, 1861.

88. W. Bullough, Blackburn—Imp. in looms for weaving.
94. H. Matheson, Lahore-terrace, Sydenham-road, Croydon, Surrey—Improved apparatus for generating steam.

Dated 14th January, 1861.

100. J. Baldwin, jun., and J. Crossley, Halifax—Imp. in machinery for combing wool or other fibrous substances.
102. W. Desilva and T. F. Griffith, Liverpool—An improved construction of instrument for taking observations at sea or on land.
104. J. Horsey, Belvedere-road, Lambeth, Surrey—Imp. in pouches or receptacles for tobacco and other articles.
106. J. Lark, Canal-house, Strood, Kent—Imp. in the manufacture of Portland cement.

Dated 15th January, 1861.

110. J. Willcock, 89, Chancery-lane—Imp. in gas regulators. (A com.)
114. R. Wilson, Patricoft, Lancashire—Imp. in screw propellers, and in machinery or apparatus for actuating the same.
118. A. V. Newton, 66, Chancery-lane—Imp. in the construction of railway and other carriages. (A com.)
120. J. Picken, Birmingham—Imp. in breach-loading fire-arms and ordnance.
122. H. Sagar, Broughton, Manchester—Imp. in machinery for finishing patent tracing cloth and woven fabrics.

Dated 16th January, 1861.

124. E. Whittaker and J. Clare, Hurst, Lancashire—Imp. in machinery or apparatus for preparing cotton or other fibrous materials to be spun.
126. J. W. Graham, Manchester—Certain imp. in machinery or apparatus for cutting, shaping, and dressing stone or other similar substances.
128. J. Telfer, Newcastle-upon-Tyne—Imp. in capstans and winches for hoisting, which improvements are also applicable to the steering of ships.

Dated 17th January, 1861.

130. W. Spence, 50, Chancery-lane—Imp. in machinery for making butt hinges. (A com.)
131. J. H. Craven, Keighley, Yorkshire—Imp. in spinning and doubling wool, cotton, silk, flax, and other fibrous substances, and in machinery or apparatus employed for the same.
132. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Imp. in apparatus and materials for filtering water and other liquids. (A com.)
133. G. Lewingdon, Bridport, Dorsetshire—Imp. in chimney and ventilating cowls.
135. W. Clark, 53, Chancery-lane—Improved apparatus for raising fluids. (A com.)
136. E. Jullien, Marseilles, France—Imp. in machinery for preparing and treating hides and skins in the manufacture of leather.
137. M. Henry, 84, Fleet-street—Imp. in apparatus for locomotion, and in the construction of certain wheels employed therein, and of levels used therewith, such improved wheel and level being also applicable for other purposes. (A com.)
138. J. R. Joy, All Saints street, Bristol—Imp. in machinery or apparatus for lithographic printing,

Dated 17th January, 1861.

139. J. Townsend and J. Walker, Glasgow—Imp. in mordanting, and in the manufacture of products to be used as mordants and otherwise.
140. E. Argent, White Lion-street, Pentonville—Improved apparatus for lifting and tilting casks, or other receptacles containing fluids.
141. I. Bates, Dukinfield, Cheshire—An imp. or imp. in apparatus for preparing warps for the loom.
142. R. Mason, Alford, Lincolnshire—Imp. in apparatus for washing and churning.
143. J. Jobson, Derby—Imp. in the manufacture of stove grates.
144. W. E. Newton, 66, Chancery-lane—An improved clutch apparatus for transmitting motion to various kinds of machinery. (A com.)

Dated 18th January, 1861.

145. B. Piffard, 17, Caroline-villas, Kentish Town—Imp. in the preparation of non-conducting substances, for the deposition thereon of metals by electric action.
147. W. A. Lyttle, 10, Arundel-street, Strand—Imp. in, and connected with, projectiles, to be used with ordnance, rifles, and other arms.
148. F. G. Sanders, Poole—Certain imp. in the construction of boxes for containing earth for growing shrubs or trees, which imp. are also for paving, flooring, building, and other purposes.
149. R. M. Latham, 71, Fleet-strret—Imp. in the construction of children's rocking toys. (A com.)
150. J. Bond, Tom Law, near Darlington—Imp. in railway wheels.
151. H. Vandercruyce, Cours du Trente Juillet, No. 32, Bordeaux—Improved means or apparatus for lowering or striking the masts of ships at sea with sails and courses set.
152. C. W. Lancaster, New Bond-street, Middlesex, and J. Brown and J. Hughes, Newport, Monmouthshire—An imp. in constructing forts, screens, and other like defences.
153. J. B. Rickards, Snow-hill, London—Imp. in the construction of axle boxes for the wheels of vehicles used on railways, applicable also to the wheels of vehicles used on common roads, for the purposes of reducing friction. (A com.)
155. M. Henry, 84, Fleet street—Imp. in machines for manufacturing corks, bungs, spiles, and such like articles. (A com.)
157. W. Clark, 53, Chancery lane—An improved device for balancing slide valves of steam engines. (A com.)

Dated 21st January, 1861.

159. C. E. Albrecht, Radnor-place, Hyde-park—Imp. in instruments or apparatus for indicating or measuring the pressure of steam and other fluids.
161. Lieut. J. Scott—23, Michael's-place, Brompton—Imp. in rifles and their projectiles.
163. R. Mushet, Coleford, Gloucestershire—An imp. or imps. in the manufacture of cast steel.
165. T. Stewart, Northampton-street, Clerkenwell—Imp. in vehicles known as hansom cabs.

Dated 22nd January, 1861.

167. C. W. Siemens and F. Siemens, Great George-street, Westminster—Imp. in furnaces.
169. G. White, 7a, Pancras-lane—An improved warping and beaming mill. (A com.)
171. R. Philp and J. Philp, 9, Lower John-street, Golden-square, Middlesex—An imp. in propellers for propelling ships, boats, and other vessels in water.
173. R. Henderson, 15, Park-place, Bayswater-road—An improved "dumb-jockey" for breaking or training horses.
175. J. Chatterton, Highbury-terrace, and W. Smith, Pownall-road, Dalston, Middlesex—Imp. in the manufacture of telegraphic cables.
177. R. A. Brooman, 166, Fleet-street—An improved method of manufacturing tyres for wheels, hoops, and rings. (A com.)

Patents Sealed.

[*From Gazette, February 1st*, 1860.]

January 31st.

1686. J. Ferguson.
1866. A. F. Haas.
1878. F. X. Kukla.
1881. E. A. Count de Strada.
1889. R. Bodmer.
1899. H. de Mornay.
1913. J. Webster.
1919. J. Fielding, D. Whittaker, and B. Croasdale.
1946. J. Wilkins.
2108. W. E. Newton.
2212. J. Chesterton.
3599. E. Breffit.
2668. D. Joy.
2704. Sir P. Fairbairn, Knt., and R. Newton.
2874. B. Beniowski.
2946. H. Greaves.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, January 30th*, 1861.]

January 28th.

151. C. N. Kottula.
165. R. Weare.
166. J. Wotherspoon.
176. P. Ashcroft.

January 30th.

186. W. J. Hay.

[*From Gazette, February 5th*, 1861.]

January 31st.

214. E. and T. Collingwood.

February 1st.

190. J. Sholl.

February 2nd.

203. J. Harrison.
204. R. Harland.

Patents on which the Stamp Duty of £100 has been Paid.

January 28th.

224. B. O'Neale Stratford.

January 30th.

234. L. Young and E. Marten.
259. J. Beattie.

[*From Gazette, February 5th*, 1861.]

February 1st.

261. A. Mohler.

Journal of the Society of Arts.

FRIDAY, FEBRUARY 15, 1861.

DISTRICT MUSEUMS AND GALLERIES OF SCIENCE AND ART.

Upon the recommendation of the Committee to which this question was referred, the Council have passed the following resolutions:—

1. That the Society of Arts will promote the establishment and improvement of District Museums and Galleries throughout the United Kingdom, where objects of art and science may be exhibited, at times and under regulations which shall afford to all classes of the people the greatest advantages.

2. That the course of action of the Society shall be, to endeavour to bring District Museums into connection with this Society, the British Museum, the National Gallery, the South Kensington Museum, Kew Gardens, and other national institutions, and with private Societies, such as the Royal Horticultural, the Botanical, Zoological, Chemical, and Microscopical, with the view of establishing a systematic circulation of objects among District Museums; to endeavour likewise to promote contributions from public bodies and private individuals for the same purpose; to hold conferences from time to time when the subject may be discussed; to seek the assistance of Parliament when necessary; and generally to assist in promoting the objects in view.

3. That a General Committee be appointed to promote these objects, to consist of the Council of the Society, the representatives of all Institutions in Union and the promoters of district museums and galleries, with power to add to their number, and to appoint the necessary sub-committees.

4. That a General Meeting shall be held at the Society's Rooms, to which influential persons desirous of promoting the proposed objects shall be invited.

GUARANTEE FUND FOR THE EXHIBITION OF 1862.

The following additions have been made since the last announcement in the *Journal* for January 25:—

*** *The name marked with an asterisk is that of a Member of the Society of Arts.*

NAME.	Amount.	Representing the Objects of the Society—Arts, Manufactures, and Commerce.
Amount last announced	£370,100	
Lord Stanley of Alderley, 40, Dover-street, W.	500	Arts.
J. F. Quin, M.D., 111, Mount-street, Grosvenor-square, W.	100	Arts.
Alan Potter, 28, Falkener-square, Liverpool...	1,500	Arts.
*Vincent Brooks, King-street, Covent Garden, W.C.	200	Arts.
Total	£372,400	

By Order, P. LE NEVE FOSTER, *Secretary.*

TENTH ORDINARY MEETING.

Wednesday, February 13, 1861.

The Tenth Ordinary Meeting of the One Hundred and Seventh Session, was held on Wednesday, the 13th inst., James Copland, Esq., M.D., F.R.S., in the chair.

The following gentlemen were proposed for election as members of the Society:—

Bake, Henry	8, Philpot-lane, E.C.
Davis, Richard	9, St. Helen's-place, Bishopsgate, E.C.
Hare, Thos. Matthew...	31, Essex-street, Strand, W.C., and 6, Torriano-terrace, Gloucester-place, W.
Letts, Thomas............	8, Royal Exchange, E.C.
Walker, William	Kirkstall-road, Leeds.
Weir, Gilbert	7, Queen's-square, Belfast.

And as a Corresponding Member.
Guréin-Menneville, Paris.

The following candidates were balloted for and duly elected members of the Society:—

Battam, John H..........	Gough-square, E.C.
Cresswell, A. J. Baker .	Cresswell, Morpeth.
Dixon, James W.	Cornish-place, Sheffield.
Hartley, Bartholomew H.	Red-hill-lodge, Red-hill, Surrey
Ledger, George	5, Caroline-street, Bedford-square, W.C.
Malcomson, William ...	Milfort, Portlaw, Ireland.
Murray, Andrew	2, Old Palace-yard, S.W.
Porter, John H.	Birmingham, and 10, Old Cannon-street, E.C.
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The Paper read was—

ON THE USES OF TEA IN THE HEALTHY SYSTEM.

By Edward Smith, M.D., LL.B., F.R.S., Assistant Physician to the Hospital for Consumption, Brompton, &c.

I have the honour of asking your attention to-night to the consideration of a substance of most general use in this and many other countries, which is an adjunct to food, rather than food itself, but which, by the social arrangements now existing, and the taste which has been acquired for it, is regarded almost as a prime necessity of life. It ranks amongst foods, in the estimation of the

community, as high as cotton is held amongst the raw staples demanded by our manufacturers; and indeed it would be difficult to know which of the two would be retained if the nation were called upon to sacrifice one or the other. The characteristic of the food of an Englishman has heretofore been roast-beef and beer; but, without interfering with the pre-eminence of those substances, we may certainly now add the further characteristic of tea, if, as in our laws, the female is held to be included in the male, and the term Englishman comprehends also that of Englishwoman.

Hence, I am relieved from any necessity for a lengthened introduction to our subject, and may at once proceed to consider the mode of action of this valuable substance upon the human system, with a view to determine the conditions to which it is, or is not, fitted; and to this I propose to add some observations to the ladies on the selection and preparation of tea for the table.

We have the authority of the most populous nation in the world for the statement that "tea is an exceedingly useful plant," and "that if we drink it the animal spirits will become lively and clear." They also affirm that it tends to "clear away impurities, to drive off drowsiness, and to remove or prevent headache." The Chinese have used the plant for more than 1,200 years; and, therefore, must have had, even with their notions of time, a good opportunity of forming a correct opinion upon its merits. We, also, a nation situated in a different climate, and living under very different conditions, have some experience on the same subject; for since the days of Charles II., some two centuries ago, when 2 lbs. of tea was a choice present for a Queen, we have reached a period when each man, woman, and child in the kingdom drinks, on the average, more than twice that quantity each year, and when the total British annual consumption of tea is upwards of eighty-six millions of pounds, and have arrived at the same conclusion—for that tea is "the cup which cheers and not inebriates" is a statement found amongst our household words. If to this conjoined testimony we add that of the extension of its daily use to the vast regions of Asiatic Russia, America, and Australia, and the increase in its consumption by every European State, we must admit that a remarkable unanimity exists as to its kind and degree of value for the welfare of mankind. Let us now seek to ascertain the mode of its action.

The late excellent writer, Professor Johnstone, in an article in his "Chemistry of Common Life," sought to explain its utility by reference to its chemical composition; and after discussing the effects of its principal ingredients, viz., the volatile oil, the theine, the tannin, and the gluten, arrived at the conclusion that tea lessens the waste of body by the theine, and supplies flesh-forming material by its gluten. He says, (but you will bear in mind that Professor Johnstone was a chemist, and not a physiologist) "the waste of the body is lessened by the use of tea, and if the waste be lessened, the necessity for food to repair it will be lessened in an equal proportion. Tea, therefore, saves food—stands, to a certain extent, in the place of food." This is a most important statement, and has reference to the theine as the peculiar active principle of tea, and to the gluten which is found in the leaves of tea and of other plants. He refers to the practice of the Tartar tribes, who drink the tea leaves powdered and dissolved in water, with salt and fat, and eat them with milk, butter, and roasted meal, and states that tea (but mark the other components), "first directly nourishes by the gluten and milk and meal it contains, and second, it makes this food go further by virtue of its theine." In further illustration, he cites the very utilitarian, and, if his statement be true, the rational mode of taking tea adopted by some of the inhabitants of South America, who, after drinking the infusion, eat the leaves.

This view raises a new question in the use of tea—one which seems to have escaped the attention of the Chinese, and is not found even in those mines of truth, the homely sayings of our own land, for it is said "to cheer," but it is not said "to nourish or fatten," and it is affirmed to "remove impurities," which must mean the removal of wasted and useless material, and not the supply of new material for digestion and transformation. Beers have been found to fatten the body, but it would be a new thing to feed a person on tea. We should expect such a person to become "small by degrees and beautifully less." Hence it is important to consider how far this statement, as to the nutritive properties of tea, is borne out either by the chemical composition of the leaf or by actual scientific observation of its effects upon the human system. The statement that tea cheers and removes impurities manifestly implies that it increases the transformation of food or tissue, for to cheer implies increased nervous action, and to remove material implies waste of the body; and hence, on the one hand, popular experience informs us that tea causes waste, and, on the other, science is appealed to to show that tea nourishes the body. Either these opinions contradict each other; or, as it may be possible to show, they are both, in a degree, true.

There are thus three questions raised in reference to the influence of tea:—

1. The waste of the body is lessened.
2. The body is nourished.
3. By lessening waste we may lessen supply, and yet the bodily powers shall be duly sustained.

We will first offer a few remarks upon each of these questions.

Now as to the value of theine, or the active principle of tea, in retarding waste of the body. It is to be observed that it has been deduced from the statement that it lessens the amount of nitrogenous or flesh-forming material which is thrown out of the body, and this has been stated on the authority of many, and is held to mean that thus the waste of the flesh of the body is lessened.

This last assertion was the opinion which Liebig introduced, and which has, until recently, controlled the scientific world. But now it is known that the waste of nitrogen, or the so-called flesh-forming material which is said to be lessened by tea, depends clearly upon at least three things:—1. The destruction of those tissues of the body which are composed of nitrogen; 2. The mere kind of food taken, as gelatine, for example, which, whilst it has small power to nourish the body, increases largely the excretion of nitrogen; and 3, Quantity, or perhaps excess of food, for two distinguished members of this Society, Messrs. Lawes and Gilbert, have shown incontestibly that, if two pigs are fed on foods varying in the amount of nitrogen which they contain, they will differ in the same proportion in the amount of nitrogen which they will throw out. When, therefore, the excreted nitrogen may proceed from excess of food, or kind of food, or perhaps from unassimilated food, as well as from the tissues of the body, it is idle to regard its diminution as necessary evidence of the lessened waste of tissue. Hence, Prof. Johnstone's grounds for commending the use of tea cannot be conceded.

The different methods of inquiry to which I referred in my former paper are doubtless the causes of the discrepancy and errors in the results obtained by various observers. When doses of tea are added to, or given in place of, substances of unknown influence acting upon the system at the same time, it is impossible to determine their separate effect with certainty. As well might a banker keep the accounts of a particular customer, who had paid money into, and received money out of, the bank during the day, by placing to his debit or credit whatever difference might appear in the general cash at the end of that day, as compared with the amount noted at the end of the previous day, when hundreds had also paid in and received out variable sums on both days. Yet such has been the method adopted by those who affirm that tea lessens the waste of the body.

Böker, whose experiments are more extended than those of any other observer, when comparing the effects of tea and coffee with other foods, fell into the great error of omitting a pint or even a quart of milk for breakfast when

he took tea or coffee, and of drinking it when he would compare the two sets of results together. Now, tea and coffee offer scarcely any nitrogen to the system, whilst milk gives 44 grains in every pint, and hence he might well find that less nitrogen was given out when tea or coffee was taken, than when milk was taken, but without at all showing that the tea or coffee lessened the excretion of the nitrogen.

But opposed to these results we have those of Professor C. G. Lehmann and my own. Professor Lehmann, a most distinguished German chemist and physiologist, and the most distinguished writer on physiology on the Continent of Europe, found the contrary, and proved that tea increases the emission of such compounds; and he remarks that he cannot say whether this was due to the increase of all the vital actions of the body which accompanied its use, and which would cause increased waste of all kinds, or to the nitrogen which it contained, and which, being in excess of the wants of the body, would thus be thrown off.—(*Physiol. Chemistry*, Vol. II., p. 419.)

In some experiments which we made upon four prisoners, kept under absolutely uniform conditions, to whom we gave tea and coffee each for three days during a part of the inquiry, we found a diminution in the excretion of nitrogen but for one day only, and at the end of the six days the quantity was more than 30 grains per day greater than it had been on the day before the experiment began, as is shown in the diagram on the wall. During this period, however, there was no diminution in the quantity of water eliminated.

That there is increased and not decreased vital action due to tea is familiar to us in its effect in preventing sleep; and is affirmed by the Chinese, when they state that "if it be drunk too freely it will produce exhaustion and lassitude," and if there be increased action in the body, there must be increased waste, as surely as that a wheel cannot be driven round with increasing velocity without causing increased friction, and increased waste of its own structure, or of the lubricating oil, or of the substance upon which it revolves. Hence we think that on this evidence the property of theine in retarding waste, and thereby lessening the necessity for food, must submit to the Scottish verdict of "not proven."

Then as to the gluten, which is said to nourish the body. Good tea leaves contain 20 per cent. of gluten, but boiling water will take up only 16 per cent. of the leaf, including all the four substances already referred to, and hence the amount of gluten which we actually drink in an infusion of tea cannot exceed about 8 per cent. of the weight of the tea leaves employed. Now, if we use the eighth part of an ounce of tea, or 55 grains, the total available gluten would be about four grains, and this quantity contains two-thirds of a grain of nitrogen. If we assume that the quantity of tea employed at a meal is twice that just mentioned, and that it is taken two or three times a day, we shall see the utter insignificance of its gluten when compared with the 250 grains of nitrogen which is otherwise supplied in food and also evolved from the body daily. Hence it is quite clear that we cannot regard tea as a nutritious food simply because it affords this very minute quantity of nitrogen or flesh-forming material; but although the theory cannot be sustained on the ground indicated, we hope to be able to show that there is a sense in which tea by its gluten may improve nutrition, whilst in other conditions it may waste the system.

The real ground of Professor Johnstone's theory is not, however, the quantity of nitrogen supplied, but the indefinite assertion that by some unknown means it lessens the waste of the system.

Now, as to the advantage of lessening waste and supply. Having very recently in this room had occasion to discuss the question of waste, I will only now remind you of the fallacy of assuming that in a state of health you may lessen the waste for a long period with benefit to the system, for there must manifestly be a proper balance maintained between want and supply, and if you lessen both, as Professor Johnstone thought was the desirable action of tea on the aged, you lessen the vital action—in fact lessen life. All agencies (if there are any such except inaction) which lessen waste are only to be used in an emergency, until a due supply can be obtained, and due waste be again permitted, and such are states rather of disease than health. A merchant may be glad to find a diminution of his liabilities (or waste), but he does not look with complacency upon a proportionate and co-existent diminution of income (or supply); for whilst the one will still balance the other, he knows that it proves that his transactions are fewer and his business falling off, and that soon things will be so nicely reduced, and yet balanced, that he may close his doors. Just so is it with the human system—there must be a due amount of vital action both in supply and waste, and neither can be lessened without danger.

Hence, taking into account the known stimulating action of tea, the sources of error in the investigations heretofore made, and the results of Professor Lehmann's, as well as my own researches, I venture to affirm that there are no good grounds for stating that tea lessens the waste of the body; but I believe that it increases the products of excretion, whether from food or tissue, by increasing the vital actions. Whether this increased waste will really cause loss of weight of the body, will depend upon the amount of food supplied and the capability to transform it. Mr. Milner, surgeon to the Wakefield Gaol, in a paper which he read before the British Association in Leeds, in 1858, showed that the prisoners lost weight on the average, in a greater degree, when tea was given either in place of gruel or in addition to the gruel, a fact which shows both the direction of the action of the tea, as just indicated, and the very even balance maintained between the waste and the supply of the system in the usual dietary of these prisoners. To this question I shall again refer.

But we must not pass without notice the remarks made by Professor Johnstone on the volatile oil found in tea. This principle, although it has not yet been separately investigated, has doubtless the greatest value. It gives the flavour and odour to the tea, and upon its quality the monetary, but not necessarily the dietetic, value of teas in the market and on the table is determined. The theine and the gluten are not considered by tea merchants, and the quantity of theine is not determined by the taste. To this substance is to be attributed the headaches and nervous derangements of tea tasters, who, be it observed, only taste and do not swallow the tea, and it is said to cause even paralysis in those who have the constant duty of handling tea. Hence it is impossible not to attach great value to this substance when considering the ingredients of tea which act upon the body—an importance quite as great as that which we in a former paper attached to the aromas of pure wines; and I regret very much that I have not had the opportunity of making separate experiments upon it. The Chinese find it the most abundant in new teas, and knowing its powerful and deleterious influence, they do not use tea less than one year old, by which time it is presumed that a quantity of the volatile oil has become dissipated. The amount of it found in the dried leaf is said to be about 1 per cent. There are *prima facie* grounds for thinking that its action is that of a narcotic, and, therefore, opposed to some of the other ingredients, much as the aromas of wines have a similar action, and are quite different from that of the alcohol associated with them.

Being fully impressed with the desirability of setting at rest various questions which have arisen as to the action of our ordinary food both in the interests of the whole community and in those of science, I have during the past years prosecuted a new series of many thousands of inquiries, the details of which have been published in the Transactions of the Royal Society for 1859.

The direction of the inquiries referred to, but not made, by Professor Johnstone was, as already mentioned, the determination of the amount of nitrogen or flesh-forming material thrown off by the body under the influence of the food

in question, and as it was found that the evolution of that substance was decreased, it was assumed that the tissues of the body were undergoing less than the usual amount of waste. The direction which we have chosen has embraced the other great function, viz., the heat-forming function of the body, and has been effected by determining the amount of chemical change proceeding in the respiratory or heat-forming process, it being understood that with increased chemical change there will be increased production of heat and increased waste of food or tissue. As these are the two chief functions of the body, it is of importance that the influence of any special food upon both of them should be investigated before any attempts are made to apply the knowledge gained from either of them to practice, and by the two sets of inquiries now referred to we believe that this has now been effected. It will, however, be evident that in such inquiries there is a great liability to error, from the unknown and co-existent influence of other causes, and therefore the food experimented upon should be taken only in the quantity which man is accustomed to use, and apart from any other food, and in conditions of body which will be uniform, and interfere as little as possible with the vital actions. In the inquiry now to be referred to, we took a moderate quantity of the tea, and took it alone, while the body was at perfect rest, and in the sitting posture. It was also taken in the morning before breakfast, when the system is the most sensitive to all impressions, and when therefore the effects of the food could be distinctly appreciated. Various other precautions were taken to avoid error, but this short description of the method employed may suffice to show both the kind of inquiry and the degree of confidence to which it is entitled.

The experiments embraced the action of tea in various doses, from 25 grains to 150 grains, black and green tea—cold and hot infusions—with or without the addition of sugar, acids, and alkalies, and taken alone, as before mentioned, or after having taken other substances, as alcohols; and, indeed, under every circumstance which in any way bore upon the habits of mankind.

When tea of the finest quality was taken in the moderate dose of one-eighth to one-quarter of an ounce, infused in 10 ounces of boiling water, and drunk without any addition whatever, it uniformly, and in every experiment increased the respiratory changes, so that there was an increase of from one-quarter to one-fifth in the quantity of carbonic acid which was evolved by the lungs. This increase was rapid, and followed a definite course, so that with a perceptible effect in ten minutes, the greatest effect occurred in 45 or 50 minutes, and the whole effect subsided in from an hour to an hour and a half. There was in fact a progressive increase to a maximum, and then a progressive decrease until the whole effect ceased. With this increase in the chemical changes there was also increased frequency and depth of respiration, so that more air was inspired, and the act of respiration was performed with greater ease, frequency, and completeness. The sense of "lightness" was very marked, and was chiefly referable to the ease of respiration, whilst the cheerfulness which we have already quoted was uniformly and delightfully present. It will interest those who have adopted the system of small doses in physic to know that small doses of tea also when often repeated, have greater effect than one large dose; so that 25 grains, or a small pinch of tea, when taken every quarter of an hour for six doses, produces fourfold the effect of 150 grains taken at once, and the action is much more uniform and sustained. It is also worthy of remark that the quantity which we ordinarily take is that which produces the greatest effect, for 50 to 100 grains usually produce a greater effect than 150 grains. The latter dose became indeed a poisonous one, for it sometimes induced a distressing temporary nausea, and at others a moderate amount of narcotism. It is well that the student who wishes to maintain mental activity under difficulties should be informed that tea will aid him far better when drank in sips over a lengthened period than in the larger quantity taken within a few minutes at ordinary meals. It is also remarkable that this substance does not increase the frequency or force of pulsation when taken in moderate doses; and to the absence of increased pulsation must be attributed that calmness which attends upon, and greatly adds to the value of, the cheerfulness which results from the use of tea. These various effects are shown upon the Diagram placed at the end of this paper, on which the results of numerous experiments are delineated, and to which we invite a little patient attention.

The number of experiments made by us amount to many hundreds, and far exceed all that has been recorded by all previous inquirers, and in no instance were the results different from those just described. Hence it is impossible to doubt even, much less to deny, that tea increases the respiratory function. But those observers who have affirmed that tea lessens the amount of nitrogen evolved, also affirm that it lessens the amount of carbonic acid produced, but, as I have observed in the paper on alcohol, Prout and Hammond obtained only the per centage, and not the total amount, and others mixed up the influence of the tea or the alcohol with ordinary food having an unknown influence. I appeal with confidence to the diagrams before you, to the method which we adopted, and to your own sensations as proofs of the fact that tea increases the respiratory changes, and that in a marked and uniform degree.

I have elsewhere shown that the increase in the carbonic acid evolved under the influence of tea could not have been obtained from the tea itself, for, independently of the rapidity of the effect, the quantity of carbon evolved was much greater than was contained in the tea. Hence the very important deduction follows, that tea has the power to increase the transformation of other food, and particularly of such as contains carbon. This is probably due to the gluten which the tea contains, and which acts as a ferment.

Another kind of action, of great importance, is that which tea exerts in increasing the function of the skin, as is seen by the perspiration which often follows its use. This is the explanation of the fact which is taught by the Chinese when they say that "tea is of a cooling nature" and may be freely drank under a burning sun, a statement with which popular experience in this climate fully agrees, and it is due to a physical effect which may be thus explained: When a fluid is converted into vapour it absorbs, during that conversion, 1,000 times as much heat as it required when in its fluid state, and as this heat is rendered latent, and is essential to the constitution of the vapour, it must be abstracted from the surrounding objects and thus reduce their temperature. The action of the skin is chiefly that of regulating the temperature of the body, partly by the direct radiation of heat, but chiefly by this process of evaporation, and the rapidity with which the latter is carried on, measures the sensation of cold which will attend the abstraction of heat from the surface of the body. In this point of view the skin is the most important organ in the body, for as it regulates the heat of the body, so it must regulate the activity of all the internal organs which produce the heat and control the necessity for food, or fuel for the fire. The uniform action of tea, when it agrees with us, is to increase the rapidity of evaporation, and in hot weather, and when taken with hot water, the perspiration is often times very profuse, and the subsequent cooling proportionately rapid.

This valuable property of tea is perhaps instinctively modified by various nations, according to the wants of the consumers, those wants varying with temperature and also with the amount and kind of food which is attainable by them. Thus, the Chinese inform us that "the country people," viz., those exposed to great temperature, but without abundant food, "before drinking it, add ginger and salt to counteract this cooling property;" whilst the Russians, living in great cold, add an acid, as lemon-juice, and in this country we add cream. The mode of action of all these additions is the same, viz.: their tendency to restrain the action of the skin, and thereby to coun-

teract this special effect of tea. It is known that the opulent Chinese drink a plain and weak infusion by sips in the circumstances in which they are placed, and this can be well defended by the experiments now recorded; but it has not been hitherto known why we, inhabiting a different climate, add milk or cream to our tea with the same effect. If any one will notice the effect of a basin of milk when taken alone, he will find that the hands and the exposed parts of the skin become hot and dry, and will at once appreciate the fact that the addition of milk or fat to tea has the effect just mentioned—that of preventing the increase of perspiration and thereby the cooling of the body.

I do not know of any evidence to show that alkalies are ever added to tea with an intelligent view to the opposite state—that in which the action of the tea upon the skin is increased; but many are familiar with the fact that in this climate we add soda in small quantities, or use soft waters, with the ostensible desire to obtain a more coloured infusion. Professor Johnstone, in reference to this habit, offers the chemical explanation of the more ready dissolution of gluten on the addition of an alkali, but we venture to ask those who adopt this plan to ascertain if it be not rather due to some instinctive desire to cool the body, and would also put the same question to those who are not in the habit of taking milk or cream in their tea.

As we have referred to this matter, it may be better to state that the sugar which we add to the tea tends largely to increase the action of the latter, both upon the respiration and the skin, sugar having indeed in some respects, an action very analogous to that of tea, both in nature and degree, so that the Frenchman drinks his sugar and water as the Chinese and ourselves drink tea. Hence in a cup of tea, as ordinarily drunk in this country, we take three ingredients besides the hot water, two of which coincide in their action, and one which is opposed to them. This habit is not practised in China, and there are many in this country who take only two of the three ingredients, but very few who take the tea alone.

Moreover, when ginger, acids, milk, or fats are added to the tea there is a tendency to increase pulsation—another mode by which the action of tea is opposed, and thus the tea becomes more stimulating, but when an alkali, as carbonate of soda, is added to the tea, the soothing property of it is increased.

Thus, on a review of the foregoing experiments, we observe that the two sets of inquiries into the action of tea are harmonious, and tea has the power to increase the amount both of carbonic acid and of urea evolved; and without occupying your attention with further detail, I may sum up the foregoing remarks by stating, that *the essential action of tea is to promote all vital actions and to increase the action of the skin.* Hence it increases the assimilation of food, both of the flesh and heat-forming kinds, and with abundance of food it must promote nutrition, whilst in the absence of sufficient food it increases the waste of the body.

Having thus arrived at the knowledge of the true action of this substance, we are prepared to endeavour to ascertain the states of body, or the external conditions in which its use is proper and improper, and whilst we think this will be an easy task, we hope to be able to show that much greater discrimination ought to be employed than has hitherto been observed.

The basis of this part of our inquiry is clearly the relation between the waste of the system and the supply of food to meet that waste, and this idea must be ever present in the mind during the discussion, for the foregoing remarks shew that as tea increases all vital action, it must increase the waste of the body, *unless there be a supply of food upon which it may first act.*

In pursuing this subject we must admit that tea is not applicable under the following conditions, viz.—

1. In the absence of food, for then it must increase the waste of the body. If, however, it follow a large meal, as the dinner, the system is then replete with food, and although no food may be taken with the tea, the tea cannot be said to be taken in the absence of food.

2. At breakfast, except there remains unused food from the supper on the previous night, or except the system be usually too full of nutritive material, as in those who dine heartily at a late hour.

3. To the ill-fed, except there is also deficient power to transform the kind of food attainable.

4. To those of spare habit, in whom all the vital actions are performed with much activity.

5. To a prison or other dietary, in which it is a duty to society that the food supplied should not exceed the wants of the system.

6. To exertion, for exertion is itself the most powerful exciter of waste.

7. To low temperatures, except in connection with abundant food and clothing, and with the addition of milk, fat, acid, or ginger.

8. To those who habitually perspire too freely, unless (as is then seldom the case) there be an excessive supply of food.

9. To those cases in hot climates where the appetite is defective and the skin active.

10. To the young, in whom there is naturally the maximum amount of vital action.

11. With our principal meals, or those at which we take the greater part of our animal food, for after such meals a dry and hot skin, that is, lessened action of the skin, is a natural effect, and this would be opposed by the tea. It is worthy of note that neither the Chinese, nor any other nation, usually take tea under this last condition.

Such are some of the conditions in which tea should be withheld, and in reference to most of them the results of science correspond with actual practice. It is not usual to give tea to children, or with animal food, as at dinner, or at breakfast, or in prisons, and we seek a stronger beverage in hot weather and during exertion; but it is universally taken in the afternoon and evening, and after dinner, when the vital actions are declining and there is felt to be excess of food in the system. It is not taken alone as a meal, or with the idea of taking nourishment. Yet with all this instinctive propriety, the cautions now given are not universally adopted, and in such instances as in those who perspire freely, and those of spare habit, much ignorance prevails, to their own detriment.

The subject of low temperatures and exertion raises that of the fitness of tea to supplant spirituous liquors in the dietary of our sailors when residing in the Arctic regions, and has given rise to much difference of opinion. In a recent work on Arctic voyages, it is affirmed that after the first year's residence the appetite for food changed, so that large quantities of fat were consumed, and tea was found to be highly acceptable and beneficial. The explanation of this last fact appears upon the face of the statement, for it was the excessive quantity of fat which, by its action in lessening the activity of the skin, as well as by the necessity for its own transformation, rendered the action of tea desirable. Dr. Kane, in his interesting work, states that his crew were pledged to the avoidance of spirituous liquors, but in one period of exposure and fatigue of great danger, he gave them brandy; at another period, when great labour was temporarily required in great cold, he gave them hot coffee; and in their ordinary dietary he authorised tea, but he does not give any grounds for this variation. We are informed by an Arctic navigator of great experience and high position, Sir James Ross, K.C.B., F.R.S., that this large increase in the consumption of fat in the Arctic region is not necessary, provided the quantity habitually supplied to sailors is duly eaten; and it is quite clear that in the absence of an unusual quantity of salt or fat, or some other substance, which tends to lessen the evaporation from the skin, the use of tea is not especially indicated. The problem is one of a mixed nature, each part of which must be investigated before a truthful conclusion can be arrived at.

That sailors can do their work better with tea than with

other beverages cannot be, as already proved, because it supplies nourishment, but because it causes the avoidance of a disturbing and therefore evil habit, or promotes the digestion of food, as will be shortly pointed out.

We may now briefly look at the opposite view of the question, and point out the states in which the use of tea is clearly beneficial. These are—

1. Some time after a full meal, when the system is oppressed by food, or by the heat produced in its conversion.
2. In the after part of the day, when the body is full of partly-digested food, and when the activity of the transforming function is considerably lessened.
3. For the corpulent.
4. For some of those in whom the vital actions proceed slowly, and in whom the power of transforming food is greatly lessened.
5. For the old, with their deficient vital actions.
6. For hot climates, and especially to those who, living there, eat freely and drink milk or alcohols.
7. In cases of suspended animation, as from drowning, where the object is to restore the respiratory functions—an object more likely to be assisted by hot tea than by brandy.
8. For those who eat much starchy (bread, rice, &c.) and fat food, and especially if they do not take flesh. This is due to the fact that our experiments have proved that tea clearly promotes the transformation of starch and probably also of fat—in the former case by means of its gluten, which doubtless acts as a ferment in reference to the starch.
9. For soldiers, who in time of peace take too much food in relation to the waste proceeding in the body.
10. For soldiers and others marching in the heat of eastern climates, for then, by promoting evaporation and cooling the body, it prevents in a degree the effect of too much food and of too great heat. For this purpose a cold infusion may be used (as a hot infusion could not be obtained); of this a quantity equal to 25 grains of tea should be taken often during exposure. We urge this upon the consideration of our military authorities, in the conviction of its great value in preventing the occurrence of sun-stroke and of other diseased states of system due to excess of heat, and have entered into the subject more in detail in a short paper published in the *Medical Times and Gazette* for 1860.
11. For the sedentary, who require increased vital action.
12. For those who have usually a dry and non-perspiring skin.

All these conditions resolve themselves into this general law that tea is beneficial in all conditions in which there is temporary excess of food regarded in relation to the necessity of the system for it and the power to transform it.

Such is a concise view of the results of our enquiry into the influence of tea, and we cannot but think that it will suggest to thoughtful minds material for reflection and practical application. It is evident that the way the instinctive cravings of man find expression in the (right) use of this article of food, with singular unanimity, under the most diverse circumstances of climate and condition, confirms the truthfulness of scientific research, whilst at the same there is much reason to fear that in our own country the indiscriminate employment of a substance which possesses great power, is daily leading a large portion of the community to their own injury.

We hinted, in the earlier part of this paper, at the possibility of showing that there is truth both in the statement made by Professor Johnstone and in those which are now offered, although the former asserts that tea nourishes, while the latter demonstrate that it may waste the system. The key to the solution of this enigma is found in the explanation of the source of the nitrogenous or flesh-forming material which is thrown out of the body under the influence of tea. It has recently been shown that this is partly due to the waste of tissue, partly to the conversion of food, and partly to excess of food. Hence, if tea cause an increase, it may do so by the second method, and, therefore, whilst it does cause this increased waste, it at the same time nourishes the body, for it causes also the more perfect assimilation and an increased consumption of food. This explanation at once reconciles the two statements, but only in the conditions—1st, in which there is abundant food; and, 2nd, when food, whether sufficient or insufficient, is not properly digested or transformed. The sagacious Baron Von Liebig pointed out the analogy between the active principle of tea and the active principle of the bile, and both doubtless tend to the common end of promoting the digestion of food. All parties, be it remembered, agree that tea acts beneficially upon the system, and the only difference of statement is whether it acts by lessening the waste of the body, and, therefore, is useful only to the ill-fed, or, by promoting the transformation of food and removing excess, whereby it is more or less advantageous to all classes.

This is the truth at which our experiments have brought us, and we may close these remarks with a summary of the effects of tea in the following words: If there be an abundance of food in the system, and that especially of the farinaceous or fat kinds, tea is a powerful digestive agent, and by promoting the transformation of food it aids in nourishing the body; but with a deficiency of food in relation to the waste of the tissues by exertion, or the waste of heat by cold or by too profuse evaporation from the skin, it wastes the tissues of the body and lowers the vital powers. With deficient food, as in the case of the poor basket women, but with deficient powers of transforming or digesting it, tea will promote digestion and thereby indirectly nourish the system, although it will increase the vital actions. The three parts of the problem are want, supply, and transformation.

I must add a word in reference to those cases in which tea is not found to be beneficial. Tea is known to act very differently on different persons, and I am informed by one gentleman that he never takes it without finding an accumulation of water in his body, as shewn by a small dropsical effusion into the skin; and if retention of water were shown to be at all general, it would account for the temporary diminution in the excretion of nitrogen. The most distinguished medical man of the day, when asking if I had noticed any difference in the effects of green and black tea, expressed his conviction that the former was the more powerful. The explanation of this is clear—green tea, if fine, undoubtedly contains more of the chemical elements of tea than ordinary black tea, for it is commonly the young or newly-formed leaves, and is not fermented, but the true reason is the greater weight of green when compared bulk for bulk with black tea, so that one tea spoonfull of green is heavier than two of black. Hence those who drink green, drink very strong tea (comparatively colourless though it be), and it may well have greater influence upon them. Another very distinguished chemist informed me that after taking tea or coffee for a few days he became irritable and peevish, and was obliged to discontinue it for a short time. Many complain of the effect of tea upon the stomach, causing a grinding or gnawing pain, and leading to indigestion, and this is probably due to the tannin which is found naturally in tea, but more commonly added to it in the form of valonia, with a view to give it a rougher and stronger flavour. When it is taken for breakfast it more commonly causes indigestion, owing to the sensitive condition of the system, and the absence of any accumulation of food. The wakefulness which follows the use of tea in many persons is doubtless the effect of increase in the vital actions, conjoined sometimes with the above-mentioned effect upon the stomach, and it, in some degree, follows the use of any other agent which acts in a similar manner, but in many instances it is due to the action of the tannin upon the coats of the stomach.

I shall now close this discussion on tea with some remarks specially addressed to the excellent housewives,

without whose presence the tea-table would be cheerless, notwithstanding the enlivening properties of tea, and with all deference and courtesy offer the following suggestions for their guidance, when selecting and preparing this most welcome cup :—

First in the selection of tea.

There is both much ignorance and much mystery in nearly all minds in reference to the selection of tea. Generally, I believe, we are guided by the price, by our opinion of the strength of the tea, and by the quality which the tea dealer may chance to send. But it will not be difficult to point out a few particulars by which this evil may be remedied, and ladies be led to act with that intelligence in this which marks their conduct in other matters.

There are green and black teas, but they are all the product of the same kind of plant, yet the green tea is commonly produced in a different district from the black teas, and the different varieties of black teas are grown in different localities. In this respect it may be compared to wine, which we know obtains different flavours and qualities according to the locality in which it is produced, and yet all varieties are derived from the grape.

There are six kinds of green teas, viz , gunpowder, imperial, young hyson, hyson, twankay, and hyson skin, but all are produced from the very same tree. Thus, a green tea planter pulls all the leaves off the trees and mixes them together. They are then taken to the manufactory, where, being placed upon a heated plate of metal, twisted in various ways by the rotatory movement of the hand, and curled up in various degrees by the heat applied, a mixture is produced which contains all the kinds just mentioned. The leaves which are curled up the closest are sieved out, and this constitutes gunpowder, the next size above is the imperial, the next the young hyson, and so on to the twankay and hyson skin, which are the largest leaves, and thence the least curled by the process employed. As a rule, the younger the leaf the more readily and more completely it curls up, and hence the gunpowder is commonly the youngest leaf, and the twankay and hyson skin the larger and older leaves. This process may be roughly illustrated by referring to the manufacture of shot. The lead is melted at the top of a tower, and falls into water at the foot of the tower, where, on examination, it is found to consist of grains of various sizes. It is then passed through sieves having holes of various dimensions, and is separated into the numerous sizes of shot which are found in our shops. In both the manufacture of the tea and the shot alike, there is a common mass, and the final distribution is regulated simply by size. The teas thus assorted are packed in boxes, and the whole quantity, called a chop of tea, is sent to the market. The Americans are wise enough to take all the larger teas, which are cheap, and leave us the small teas, at a doubly or trebly increased price. Black teas gain their colour by fermentation, and are of three principal kinds, souchong, congou, and pekoe. Formerly there was also bohea, but that is not now brought to this country. The term pekoe means flower, but it is applied to specimens which do not contain the flower. Souchong and pekoe are the finest teas, but are comparatively rare. Congou is the kind of black tea almost universally sold.

It must next be borne in mind that, whilst there are so many kinds of tea, each kind is liable to vary greatly in quality, so that the mere name of the tea is no evidence of its real value. At this point, we see the importance of taste and technical knowledge as to the manufacture of tea which experience alone can give, for by this, and not by the name of the tea, the price is attached to it. Hence in selecting a tea, it is needful to remember that the qualities of even genuine tea vary so much that the quantity of its valuable constituents is nearly three times greater in the best than in the commonest kinds. Therefore, tea must not be accepted simply because it is tea, neither must equal quantities of a good or bad tea be employed. The best tea is that which contains part of the flower and the youngest leaves of the plant. My friend, Mr. James Moul, informs me that the finest kinds of green tea, whatever the process of preparation, have a pale yellowish leaf. The infusion should be perfectly clear, without sediment, and should possess a delicate tinge of yellow. In black tea, the leaves should be of a reddish or brownish black, fragrant, and free from any artificial scent, and the infusion should be clear and of a bright red. The beautiful perfumes from artificially-scented teas, as, for example, orange-flavoured pekoe, are not derived from the tea—have no property in common with the tea, and are drawn out and dissipated with the first cup, and therefore are valueless, and to be avoided. The natural colour of the leaf, when growing upon the tree, is a dullish green, and hence amongst green teas, those which have a pale colour are more natural, and are generally those of the finest qualities, but the bright green teas are usually coloured artificially or glazed, and are not of the best qualities.

It will be found that teas differ in weight bulk for bulk, that is to say there will be more spoonfuls in a pound of one kind than in the same weight of another kind, as, for example, the heavy small, round leaf gunpowder as compared with the light, long, twisted, and wiry-leaf congou, souchong, and pekoe. To this I am anxious to ask your earnest attention for a moment. The common test of the spoonful is fallacious, both as respects the real amount of tea supplied and the relative cost of each day's consumption. One tea spoonful for each person, and one for the pot, as our mothers directed us to use, will make an infusion more or less strong, more or less valuable, and more or less costly, according to the weight of that quantity. I now show to you several specimens of teas, kindly furnished by Mr. Moul, and will prove to you in how great a degree the bulk and weight differ. The weight of a fairly and evenly taken caddy spoonful of each of these teas, and the number of tea spoonfuls in the lb., is as follows :—

	Grains.	Spoonfuls per lb.
Black Teas.		
Oolong	39	179
Inferior congou, large leaf	52	138
Flowery pekoe	62	113
Souchong	70	100
Fine congou	87	80
Green Teas.		
Hyson skin	58	120
Twankay	70	100
Hyson	66	106
Fine imperial	90	77
Scented caper	103	68
Fine gunpowder	123	57

All these are pure teas except the scented caper. It is not presumed that the relation of these weights is absolutely true, for no two spoonfuls of the same tea would contain precisely the same quantity, but they are at least as near an approximation to the truth as is the actual result of any one measuring tea by spoonfuls in ordinary use. Hence it is seen, that even amongst black teas there are kinds which are twice as heavy as others, and when extremes are taken of black and green tea the difference of weight is more than three times. It is, therefore, unreasonable for the good housewife to expect to find the same strength and flavour from equal bulks of different teas, and if she should be induced to use more of a light than of a heavy tea, she may take comfort from the thought that she is not adding to her expenses, for if all the kinds above-mentioned were sold at the same price she might use two or three spoonfuls of black tea for the same cost as the spoonful of green, viz., fine gunpowder. Ignorance and inattention to this matter often cause the consumer to complain without reason to the tea dealer. It is very desirable, although not perhaps practicable, that tea should be used by weight and not by bulk, and the more so that there is no definite relation between variation

in weight and variation in quality of tea, except the general one just pointed out.

It is, however, to be well understood, that there is but little relation between the market value of the expensive kinds of tea and their true value upon the system, not such a value as would enable any one to state, that because a certain kind of tea is costly, it therefore contains more theine. The flavours of tea must be regarded as luxuries, just as we value the delicate and peculiar flavours of certain Rhenish wines, and as the quantity of such tea is small and the supply variable, so most those pay highly for it who have taste enough to attach a high value to it. It is known that the teas of the choicest flavour are never exported from China, and from their great value are drank only by the wealthy classes, whilst the finest teas which are exported find their way by the Caravan ronte to Russia, and there sell at almost a fabulous price. Such teas when made weak may, without any difficulty, be drunk without milk and sugar, and then true bouquet and flavour are enjoyed in the same manner and degree that a connoisseur enjoys his finest wines.

But for all useful purposes it is better to obtain the good qualities of the so-called inferior kinds, as for example in green teas, the hyson skin, or young hyson, sold at 1s. to 1s. 6d. per lb., instead of the gunpowder sold at 3s. per lb. besides the duty. We may also fairly lay aside all prejudices as to the use of uncolored green tea, since it must have occurred to you, on hearing this paper, that the color of the infusion is no test whatever of the quality of the tea; the pale infusion of the green tea often containing far more tea than the black infusion of highly dried and rough black teas. Of black teas I would strongly recommend the Oolong tea of good quality, for although the colour of the infusion is light, it causes a choice bouquet and is pungent without being rough to the palate. I am informed that dealers find some difficulty in disposing of this tea, for whilst its price is not low, its infusion being light, is ignorantly thought to be weak. It has also the merit of being a bulky tea, and one, therefore, in which the consumer may cheat himself into habits of economy.

Second, as to the quantity of tea to be infused.

We have already stated that a moderate is preferable to a large quantity, provided good tea be selected, but it is evident that a larger quantity of coarse leaf than of fine leaf tea must be employed. Of the very finest teas used in China, a small pinch is taken as the suitable modicum. The lower orders of the Chinese obtain only the coarser kinds of tea, but even these are of good quality as compared with our inferior teas, since they are not so highly dried as those which are exported. They drink tea thus prepared in very large quantities, and there are for their convenience multitudes of tea shops, where they may obtain a quantity of the inferior infusion of tea at a very small cost.

We advise that the tea be not made "strong," but that it have a good body and fine flavour to the palate.

Third. The mode of preparation.

It is an invariable practice amongst professional "tea tasters" never to make the infusion with water which has been already boiled, but on the contrary to take fresh water and use it immediately it boils. We are informed by Mr. Fortune that the Chinese are equally careful on this point, and that very minute directions are given by their writers, thus:—"The fire must be lively and clear, but the water must not be boiled too hastily. At first it begins to sparkle like crab's eyes, then somewhat like fish's eyes, and lastly it boils up like pearls innumerable, springing and waving about." There may be something fanciful in this description, but it no doubt represents a truth in reference to the expulsion of the air which is naturally found in water, and we certainly commend the example to our gentle hearers.

Every good housewife knows too well the influence of kinds of water in making tea to render it desirable that we should dwell upon it, but we would recall to their minds that the water to be abhorred is stagnant and hard water, and that to be preferred is running and soft water. The Chinese direction is imperative, viz.; "take it from a running stream, that from hill springs is the best, river water is the next, and well water is the worst." We fear that these directions will be in some degree lost upon those who live in our great towns, who must use water which is not always clear, pure, and soft. Let them, however, filter it, and add carbonate of soda to it—the least pinch in winter, and a little more in summer. With hard water it is impossible to make good tea.

I have only one word to add: viz., make the tea yourselves, and allow it to infuse for ten minutes.

It was my intention to have offered some observations upon the action of coffee, since it is so closely allied to, and yet in some respects so different from, tea; but the time allowed to me forbad my doing so. I would, therefore, in concluding this paper, offer one observation of general import. We must not, and we do not, regard the substance which have now been discussed in the light of ordinary food, for it cannot supply the place of food, and alone cannot nourish the body. Even admitting that the elements are not unsuited as food, the quantity which we take offers no proportion to the quantity of those elements which must be supplied to the body daily. Their real power is to modify the influence of true foods, and we have shown that in this respect they are most valuable. But there is another view of the matter which cannot be forgotten. The system requires from two to three pints of fluid per day to enable it to appropriate the solid food and to rid itself of waste and useless material. This must be taken as water alone or with such substances as tea and coffee infused in it, or as milk, or as some form of alcohol. We must either drink a quart of milk or a quart of beer per day, as our forefathers did, or we must use such beverages as tea and coffee. With this moreover, there is a call for increase of heat in the body, and partilarly in cold weather, in the absence of food, and in the ill-fed. This is met either by the use of warm drinks or by fluids as beer or other alcohols, which stimulate and give a sensation of warmth within. It has often been asked why poor hard-working women relish their tea so greatly, and the answer has been either that it nourished them, or, by lessening the waste of their bodies, it enabled the food to go further. The true answer must contain three items: the tea cheers and increases vital action, enables the bread to be more quickly digested, and the heat of the fluid supplies a comfortable warmth. No fluid meets these requirements better at the same cost, but all would admit that if the poor could obtain hot milk it would be found to be far more beneficial.

In some experiments made upon myself, in which for several days I tried to live on bread and water only, I found it to be absolutely necessary that the water should be warmed, both that it should not abstract heat from, and that it should give heat to the body. Those only who have tried this can appreciate the value of warmth in our beverages, and may well pity the poor creatures too often hastily condemned for "prison" offences to the dark cell and bread and cold water.

Let those whose aim it is to lessen the amount of alcoholic drinks consumed by our hard-working poor people, bear in mind that some other suitable fluid should be found for them, and it would confer the greatest boon to teach them the true value of milk, and to increase the facilities by which hot, wholesome milk, tea, coffee, and cocoa, might be obtained in a comfortable and economical manner.

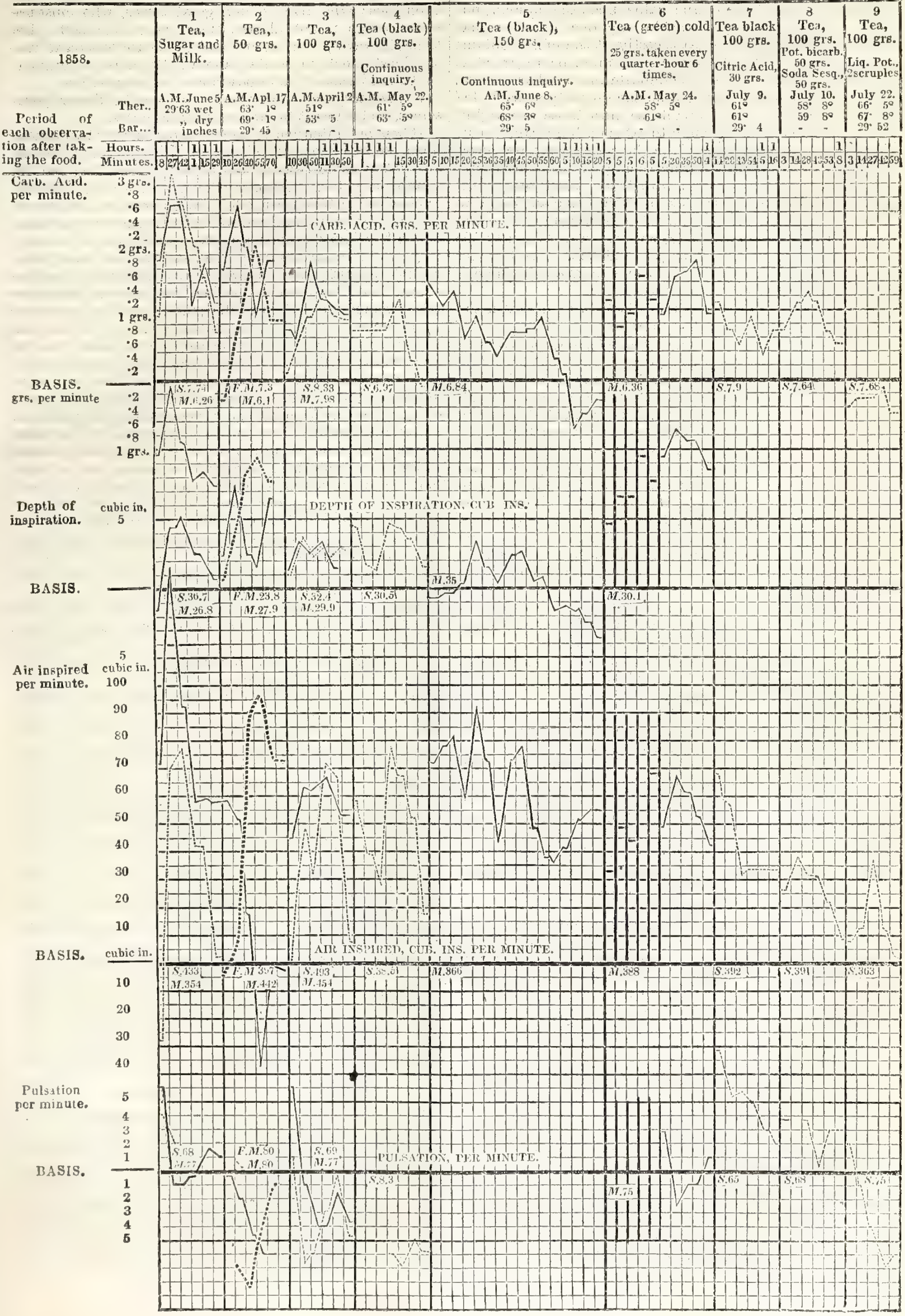
Explanation of the Diagram.

The diagram, extracted from the *Philosophical Transactions* for 1859, exhibits the effects of tea upon three persons in good health, and in the morning before breakfast, and shows the quantity of carbonic acid in grains per minute expired by the lungs, the amount of air in cubic inches inspired at each inspiration, the total quantity of air in cubic inches inspired per minute, and the rate of pulsation per minute. The quantity of tea with the substances added to it, the temperature of the air, and the height of the

Diagram showing the influence of Tea over the Carbonic Acid expired, and the quantities of Air inspired, with the Depth of Inspiration and the Rate of Pulsation.

Small Dotted Line—Dr. Smith. Black Line—Mr. Moul. Large Dotted Line—Mr. F. Moul. 0.06103 Inches = 1 Cubic Centimeter.

The numbers near each basis line are the basal quantities. S. signifying Dr. Smith, and M. Mr. Moul. The minutes at which each experiment was made after the tea had been taken are recorded at the head of each Figure, as are also the Temperature with the wet and dry bulbs (Fahrenheit), and the Barometric indications.



barometer, are recorded at the head of each series of experiments. In all the experiments except those numbered 4 and 5, the carbonic acid was collected during five minutes at the periods recorded immediately under the heading, whilst in Nos. 4 and 5 the whole of the carbonic acid evolved was collected by several series of apparatus and weighed at the periods mentioned in the same place.

The thick perpendicular lines separate each set of experiments, whilst the faint lines separate each experiment in each series, and in No. 6 the shorter thick lines are placed between the records of the effect of each of the several doses of tea which together formed the whole experiment. The duration of each series varied from one to two hours, a period sufficient to show the maximum effect, whilst the interval between the commencement of one experiment and the beginning of the succeeding one was about 15 minutes, and the number of observations was six or seven in each series.

The horizontal series of lines upon the diagram are divided into the four sets above mentioned, viz., the carbonic acid, the depth of inspiration, the quantity of air inspired, and the pulsation. In each of these there is a thicker line, which is called the basis line because it indicates the amount which was recorded immediately before the food was taken, and the effect of the substances being greater or less than the basis is represented by the series of curves, (each one or two lines representing one or two persons experimented upon) above or below these basal lines. The amount constituting each basis differed with each person and with each experiment, and hence the curves show the increase and decrease and not the actual quantities, but in order that the actual quantities may be ascertained, the basis quantities are inserted in the diagrams at each basis line, the letter S. signifying Dr. Smith, and referring to the small dotted lines; M. signifying Mr. Moul, and referring to the plain lines; and F. M. signifying Mr. Frederick Moul, and referring to the larger dotted lines.

The figures on the scale attached to the left side of the diagram will enable the reader to measure the amount represented by the curves.

By way of illustration I will give a detail of the 3rd series of experiments. It consisted of an inquiry into the effect of 100 grains of black tea, on April 2, in the morning, with a temperature of the air of 51 deg. and 53.5 deg. by the wet and dry bulb of the thermometer. There were six experiments; the first commenced at ten minutes, and the last at fifty minutes after the tea had been taken. The basis quantity of carbonic acid evolved by Dr. Smith was 8.33 grains, and by Mr. Moul 7.98 grains per minute, and there was a maximum increase of 1.72 grains per minute by the former in fifty minutes, and of 1.3 grains per minute by the latter in one hour and eleven minutes after the tea had been taken. The amounts of increase given at each experiment may be in like manner found, as may also the increase in the other three subjects of inquiry recorded below the curves of the carbonic acid.

It will be observed that there is an increase recorded in each of these subjects of inquiry in almost every experiment, as may be seen at a glance by carrying the eye along each basal line.

DISCUSSION.

Mr. W. J. Bland congratulated the meeting that the very excellent paper they had listened to had not been marred by what he considered the too common practice in the present day of scientific men,—the dwelling upon the exception and not the rule, for they had heard very little that evening on the subject of the adulteration of tea. The article valonia had, however, been mentioned in the paper. He thought it would be an iniquity to use such an article as an adulterant of tea, because the effect of it upon the system was so very different from that produced by tea. As far as his own experience in the tea trade went, he had never known valonia to be used. He had seen a preparation of that substance, and having tested its qualities, he would feign hope that the use of it, as mentioned in a previous discussion upon this subject, was only a solitary instance. Dr. Smith had alluded, in the early part of his paper, to the non-nutritive qualities of tea. He (Mr. Bland) would be sorry if it were other than non-nutritive. The essential value of tea to us, as Englishmen, consisted in the absence of nutritive qualities. We were, perhaps, the heaviest livers on the face of the earth, and we stood in need of something to modify and qualify our food, and he was pleased to hear it stated in the latter portion of the paper that after a full meal, tea, taken after a proper interval, acted as an aid to the digestion of the food. Allusion had been made to the taste of the English people with regard to green teas, and it was said, although he thought the statement was hardly borne out by fact, that the Americans wisely chose the large-leafed green teas and rejected the small-leafed samples, leaving the English dealers to pay the higher price which those samples commanded. The first that was ever heard of young hyson—one of the finest and smallest qualities of green tea—was when some of it was taken in an American prize. It had been a favourite article ever since, and the Americans were as much attached to it as ourselves. After the establishment of the East India Company, the tea, which was first supplied from China, was the quality called Singlo, and nine-tenths of the tea supplied—not merely in the earlier years of the existence of the Company, but as late as the years 1810 or 1815—was of that quality; and he would take this opportunity of remarking that the purity of the teas, both green and black, exceeded in a great degree in the present day that which they obtained under the *régime* of monopoly. There was a growing intelligence amongst the dealers resident in China as well as those in England, which, he believed, went very far to protect the public against such a system of alleged imposition as they had heard so much of lately. He felt much indebted to Dr. Smith for the way in which he had dealt with this subject, for he (Mr. Bland) was always willing to be a learner upon this matter, and this paper would always be remembered by him as long as tea continued to be, as it was to him, a subject of the greatest interest.

Mr. Malone said, having taken part in the previous discussions upon the subject, he might be allowed to express the interest he felt in the paper which had brought them together that evening. The public were greatly indebted to the Society for having taken up this important subject, and to Dr. Edward Smith for the experimental manner in which he had treated it, and they might now calculate upon the question being fairly ventilated. His (Mr. Malone's) experience went fully to confirm the statements contained in the paper. He thought the experiments brought before them were conclusive as far as they went, but it appeared to him that if they were to be really practically useful they must be much extended, and that the results of the action of tea upon the human system should be shown not only in the case of individuals in perfect health, but also in those who were in a state between health and disease. At one time he entertained the idea that tea assisted in the digestion of food after a hearty dinner, taken as an adjunct to the principal meal of the day, and, to a certain extent, he found it had the effect in that respect which was ordinarily produced by drinking milk or alcohol of considerable strength diluted with water; but ultimately he found it had an injurious effect upon the nervous system, and he had since come to the conclusion that in the case of some persons tea was highly injurious, and, therefore, instinct was not always a safe guide in such matters. With regard to the conflict between tea and alcohol, it was found in the experience of many persons that weak alcohol had a better influence upon the system as a beverage than tea; but experience would differ very widely. He did not think the time had come when they could universally recommend tea in preference to alcohol. They had heard a good deal about

the universal use of tea in China; but he could state that during the last year the reapers in Kent took alcohol in water in preference to beer, on account of the sour condition of the latter in the neighbourhood, and taking weak alcohol and water had no bad effect upon them. He thought in dealing with the broad question of recommending to the working classes one beverage in substitution for another, great delicacy and caution were required. For his own part he doubted whether moderately strong beer, made from good malt and hops, was at all inferior to tea as a beverage, but they required more complete experiments before they could come to a decision upon the question. With regard to the method of preparing tea for drinking, it would seem that the use of carbonate of soda was a wide departure from the custom adopted in China. There it appeared the infusion was made with water just boiled. All hard water contained lime and other substances, which were held in solution by carbonic acid, and in order to avoid precipitating them, the Chinese did not continue the boiling of the water, but if carbonate of soda were used, it precipitated the lime, and he was not sure whether it was a good thing to do so, inasmuch as the tannin was capable of uniting with the lime, and thus the beverage became more wholesome and less astringent.

Mr. Moul understood the last speaker to complain of the effects of tea drank as a beverage at dinner. He believed the beneficial effects of tea were experienced when it was taken at a proper time after a heavy meal. One thing was important to be considered. It was possibly the case that in England the tea was generally drunk too hot, and the large amount of hot water might account for disturbances of the system which were attributed solely to the tea; in addition to which, the ordinary concomitants of tea—such as milk and sugar—might have something to do with the effects complained of by the last speaker. They, however, had the fact before them, that tea was the universal beverage of two-thirds of the human race, and, therefore, he thought they were not in a position to ignore its beneficial properties. It was a subject worthy of investigation, and he felt much indebted to Dr. Smith for his able paper upon it. Whether consumed in the palaces of the rich or in the cottages of the poor—whether administered by the bedside of the suffering patient or to the traveller after a day of fatigue—tea must be regarded as an article which was largely mixed up with the social and domestic economy of the country, and, therefore, he considered that the attention of the public, as well as of scientific men, could not be too largely directed to it.

Mr. Reynolds congratulated the meeting that they had had a most able and interesting paper upon an important subject, with but little or no allusion to adulteration.

Dr. Carpenter, F.R.S., would express, on the part of physiologists, their thanks to Dr. Smith for the persevering and painstaking manner in which he had endeavoured to elucidate this subject. It was known to men of science that for many years past Dr. Smith had, with indomitable perseverance and strength of will, made a series of experiments upon himself and other individuals as to the influence of various conditions of food, exercise, and many other circumstances on what might be called the statics of the body, which would, he had no doubt, in the end issue in presenting them with some valuable and satisfactory results. At present, to his own mind, many of those results were, so to speak, tentative, and were valuable only as far as they went, but did not fully elucidate the subject. In any inquiry of this kind it took a long time to ascertain what the particular method of experimenting adopted would really bring out, and where it would fail. It was found, in the case of such investigators as Professor Tyndall and Dr. Pavy, that most of their early experiments merely formed the ground work for ultimate research, and that a vast deal of time and labour was bestowed in arriving at the point from which the investigation might fairly be considered to start. He did not say that Dr. Smith's experiments, brought before them that evening, answered that description, but they did not elucidate the whole subject. He would address himself to one point in particular. Dr. Smith had said scarcely anything upon what he (Dr. Carpenter) thought was one of the most important attributes of tea, viz., the specific effect of it upon the nervous system. He believed tea had a most decided effect upon the nervous system. It might be difficult to prove this, because it could not be proved by experiments upon respiration, or the measurement of the amount of urea, but they very frequently gained light with regard to the *modus operandi* of particular subjects from exceptional cases which now and then occurred. Such instances were to be found in the medical publications of the day with regard to the effects of tea in individual cases. A medical man, in investigating the habits of a patient, might attribute certain symptoms to the use of tea. He might recommend that the use of tea should be discontinued, and the symptoms might disappear, and when a number of these cases were brought together, they might have reason to believe that tea was the cause of the perturbed action of the system which these cases exhibited. With regard to the effect of tea on the digestion, he might observe that when the principal meal of the day—dinner—had been taken, and the system was charged with what was for the time an excess of food, the individual was less disposed for active mental or physical exertion. His own experience was that a cup of tea, moderately strong, taken two or three hours after a full meal, had a wonderfully clearing influence upon the mind, so that persons of studious habits generally preferred the evening, after tea, for any very great mental effort which they wished to make. He did not think it was a good habit, but persons felt the quiet they could command in the evening, that they could better concentrate the attention, especially when the brains had been "cleared" by a good cup of tea. He admitted the force of what Dr. Smith had placed before them, with regard to tea helping the blood to unload itself of the matter of which it needed to be relieved; but there was something more than this. There was the fact of the influence of tea—especially of green tea—in inducing wakefulness. Now, he believed this was generally the result of the increased activity of the mind induced by tea. When persons were restless, not arising from a feverish condition, but from a state of excessive mental activity, they had a parallel state to that which was induced by the operation of tea, especially green tea. The effect of a cup of green tea upon himself, when taken an hour or two previous to his ordinary bed time, would be to produce extreme wakefulness. He therefore felt that there was something in the peculiarly stimulating effect of tea upon the nervous system besides the influence upon the physical condition of the body which Dr. Smith had spoken of. He knew it was the habit of persons engaged upon the morning newspapers to perform a great deal of their arduous literary labour under the stimulus of strong green tea. He would add, that from black tea he had not experienced the degree of wakefulness he had alluded to, but in the case of green tea the effects were of the most marked description. He believed Dr. Smith had not adverted to a fact which had been brought out very strongly by Mr. Fortune, viz., the chemical changes that were effected in the green tea by the high temperature employed in preparing the leaf. Dr. Carpenter proceeded to mention a peculiar case which had come under his own knowledge, in which a friend of his resorted to green tea as a narcotic, finding that an infusion of one teaspoonful of it invariably in his case produced sleep. Thus it would be seen that the effects of tea upon different individuals were of the most anomalous character, and were such as to baffle the most careful researches into the subject. He had brought forward these views not for the purpose of disputing any of the results which Dr. Smith had advanced as matters of fact. He believed the tables before them contained very important facts, and he would express the high satisfaction he felt in seeing his

friend in such robust health, notwithstanding the experiments he had practised upon himself; and he could only express a sincere hope that his fate would not be that of Dr. Stark, who killed himself in trying the experiment of living upon cheese alone. He would call attention to one or two facts that were elicited by the investigations of a Commission appointed by the Admiralty about eight years ago with regard to the use of spirits in the navy. The practice in the navy was at that time to have two daily servings of grog, but the experiment of introducing tea into the navy was tried, and the evidence given before the Committee went to prove that the men to whom the choice was given generally preferred tea to the evening allowance of grog, and eventually that serving was discontinued in favour of tea, to the general satisfaction of the crews. He would also add that it had been stated by Sir John Richardson, who accompanied the first overland Arctic expedition under the late Sir John Franklin, that under the trying circumstances of such a climate, the men derived greater benefit from the more lasting heat produced in the system by tea than from spirits.

Dr. Lankester, F.R.S., wished merely to state that he thought the experiments of Dr. Smith upon the action of tea exceedingly interesting, and he could not for a moment dispute the facts brought forward ; at the same time, he felt that Dr. Smith took these facts as to the action of food upon the respiratory processes, as the basis of his reasoning, in too wide a sense. With regard to tea, for instance, he thought Dr. Smith threw over very precipitately the experiments of Böker and others, which indicated that tea had the power of preserving the tissues of the body from waste. He thought its action in this respect was not so much to increase the respiratory powers or facilitate the excretion of carbonic acid gas from the lungs, but that its operation was rather like that of a poker, which, by admitting a larger supply of oxygen, caused a larger quantity of carbonic acid gas to come out of the chimney. He must say he thought Dr. Smith had not proved that the action of tea was altogether that of facilitating and hastening the waste of the body, and that, therefore, they must be careful how they adopted the tea drinking system on that ground. Their fat friends might drink tea and find themselves fatter than ever, and lay all the blame upon Dr. Smith. There was another question with regard to the volatile oil, the theine and the tannin. It was the fact that tea contained 25 per cent, of tannin, and he did not think Dr. Smith had alluded to the effect of tannic acid upon the system. That was a most important agent in the action of tea. He thought the action of tannic acid after a full meal was injurious, as was shown by taking a heavy breakfast with a large quantity of tea, and also by the effects of tea taken very shortly after dinner. He attributed them not so much to the volatile oil and theine as to the tannic acid. He did not know how far tannic acid had to do with the facts recorded in the tables, but he could say, in taking a good size cup of strong tea that a person would imbibe about five grains of tannic acid. Theine was also proved to have an action on the nerves. Mr. Cogswell had made some experiments which showed that half a grain of theine would kill a frog, and if that were the case, they must expect it to have some effect upon the nervous system of the human frame. The volatile oils of tea were matters for further inquiry and study. The difference of action of black and green teas was very remarkable, and what the volatile oils were which they contained was at present very little known—how far they were acted upon by the process of preparation of the tea, and how far they differed in different varieties of the tea plant. Besides all this, from what they had recently heard as to the extent to which tea was alleged to be adulterated, they could not tell whether Dr. Smith's experiments had been tried with a perfectly unadulterated article. He thought they were much indebted to Dr. Smith for the persecution of himself from day to day in making these experiments. They would remain as facts to be discussed and perhaps disputed by some for years to come; and he merely threw out these hints, differing from some of the conclusions. He believed no more important thing could occupy the human mind than the subject of the laws which regulated the substances which we daily took as our food—the laws in fact which regulated our life. It became of the greatest importance that men should secure healthy and strong life, and it was only by attending to these things that they could hope to attain this.

Mr. W. J. Bland believed that the different effects upon the system of green tea and black arose entirely from the method in which each description was prepared by the Chinese—the green tea being thrown into the pans directly after it was picked, and sometimes with the dew upon it, much of the volatile oil and theine was dissipated and thrown off by the heat. Those properties were retained to a greater extent in the black teas by the fermentation to which they were subjected.

Dr. Edward Smith, in replying upon the discussion, said he was gratified by the manner in which the paper had been received and by the good discussion which had taken place upon it. If he had any regret it was that his friend Dr. Lankester was not present during the reading of the paper; for he would then have found that allusion had been made to tannic acid, to the effect that although there was 25 per cent. of that substance in tea, yet the boiling water took up only 16 per cent. of the properties of the tea altogether; and therefore he thought the statement of Dr. Lankester that a moderate-sized cup of strong tea contained five grains of tannic acid could hardly be supported. Dr. Lankester had, he thought, done him a little injustice by making it appear that he had based his observations upon experiments with regard to the respiratory organs solely. Upon this he would appeal to the earlier portion of the paper, in which he stated the amount of nitrogen that was passed off, and gave his reasons for dissenting from some of the conclusions arrived at by previous experimentalists. Both in reference to alcohol and tea he had made it a point to consider the nitrogenous condition as well as the respiratory condition. He regretted that his allusions to the experiments of Böker did not meet with Dr. Lankester's approval. He had stated his reasons for dissenting from those conclusions. He thought there were sufficient grounds for believing that when tea was mixed with other articles of food the effects were very different from those of tea taken without any other admixture whatever. From that he concluded there must be some error in Böker's experiments. With regard to the suggestion that the teas with which he had experimented might possibly be adulterated, he could only state that he received them from Mr. Moul, who was a tea-broker in the City, and he had every reason to believe the tea was as pure as could possibly be obtained. He quite concurred in the remarks that had been made as to the injurious effects of valonia upon the stomach, and the undesirableness of taking tea with a hearty meal. As to the operation of tea upon the nervous system, not only did it stimulate the respiratory action, but it increased the amount respired. It had an action through the nervous system upon the muscular parts of the body ; and that it acted also upon the mind was most clear. Of course, he could not, in his paper, attempt the solution of the entire question. He, however, hoped he had done something in that direction, and that they would accept what he had done. He only hoped some other gentleman would take up the points that were wanting, and supply all his deficiencies.

The Chairman was sure the meeting would agree that the Society was deserving the thanks of the community at large for having been the means of bringing subjects of the greatest importance to the health and prosperity of the public thus prominently before them, and affording these opportunities for their open and fair discussion. He would say of his friend Dr. Edward Smith, that there was no one in the profession who had been more indefatigable or was more

deserving of praise than he was, for the manner in which he had investigated numerous subjects connected with the social and domestic condition of the community, and they were highly indebted to him for his paper on this occasion. His own personal experience and observation confirmed the results of Dr. Smith's researches. There were several topics which were worthy of discussion, but at that late hour he could scarcely even point them out. He might, however, remark that the comparative merits of green tea and black tea deserved closer observation, and the manner of preparing tea was likewise a subject of the greatest importance. It was evident that we had very widely departed from the lessons on tea-drinking which were derived from the Chinese, inasmuch as in this country we mixed with it other articles of food which, he believed, impaired the operation of tea upon the animal economy. He believed, in order to judge properly of the merits of tea, they ought to use it in the way it had been used from time immemorial by the Chinese themselves, viz., as a weak infusion, without sugar and milk, taken in moderate quantities, and at a proper temperature. Then, again, it should only be taken at a certain period after a full meal. Its operation upon the system was restorative, and to a certain extent stimulating, but totally unlike the stimulus produced by alcohol. He believed a great deal of the ill-effects of tea upon some persons, in producing flatulency and acidity of the stomach, were occasioned, in a great measure, by the addition of milk and sugar. It was from that cause he believed that so many persons complained of the effects of tea. He might add that he considered his friend Dr. Smith had admirably illustrated the subject as far as he had gone. The time to which he was necessarily limited prevented him entering upon a variety of topics which he might otherwise have touched upon. He was sure the meeting would cordially join in a vote of thanks to Dr. Edward Smith, and would by that means encourage him to proceed with his investigations into these subjects in which they were all interested.

A vote of thanks was passed to Dr. Edward Smith.

The Paper was illustrated by a series of specimens of the finest descriptions of tea, kindly contributed by Mr. Moul.

The Secretary announced that on Wednesday evening next, the 20th inst., a paper "On the Alpaca, and its Introduction into Australia," would be read.

THE PENNY READING MOVEMENT.

On the occasion of the last reading of the winter season being given at the Lecture-hall, Tower-street, Ipswich (Friday, the 21st December), an address, signed by the joint managers, Mr. T. S. Gowing and Mr. Charles Sulley, was read by the former gentleman. The following are extracts:—

"This being the closing night of the third series of the Ipswich Penny Readings, the managers avail themselves of the opportunity of taking a brief review of a movement, which, originating in Ipswich, has now spread far and wide, and been crowned everywhere with success.

"It is true, that the winter before the Ipswich Readings began, a Public Reading Society had been started in London, with the venerable Lord Brougham at its head, and having for its honorary secretary, the able, indefatigable, and influential barrister, Mr. C. J. Plumptre; but so little had this society progressed, that in 18 meetings in London, on an average only 100 persons attended each meeting, and the expenses had to be defrayed by subscription.

"It was not till notices of the first report of the Ipswich Penny Readings appeared in the *Builder* and in various newspapers, and a full abstract was inserted in the *Journal of the Society of Arts*, which circulates amongst all the institutions of the country, that public attention was thoroughly aroused.

"At the annual conference of Institutions, held at the rooms of the *Society of Arts*, in July last, Mr. Gowing introduced the subject of these readings, when the following resolution was unanimously adopted, 'That it is desirable to establish readings in connection with the Institutions in union with this Society.' At the great Educational Meeting, at Warminster, last October, the Hon. and Rev. S. Best read a paper* on the Ipswich Penny Readings, from materials furnished by Mr. Gowing, as did also the Rev. Mr. Bartlett, of Wimbledon.

"These various notices produced for one of the managers, Mr. Gowing, a large crop of communications, not only from the parts adjacent, but also from widely scattered places in every part of England, and entailed on that gentleman an amount of correspondence in reply, which only the desire of furthering the movement could have induced him to undertake.

"Mr. Sulley, on the other hand, has been spreading a knowledge of the plans, and giving practical illustrations of the way they are to be worked out in many of the leading towns in Suffolk and Essex, and that with a degree of success which is always producing fresh applications for his personal services.

"The managers desire to remark here how much they feel indebted to the Elocution Class of this Institution, not only as furnishing some of the experience on which the Penny Reading scheme received its practical development, but as a means by which the readings themselves have been rendered additionally interesting. They have reason to believe that the appearance of some of the young members has been a source of gratification to the audiences in this hall, while it has re-acted favourably in the class itself, by exciting honourable emulation among the members. Deputations of readers from the Elocution Class have also visited several of the neighbouring towns and villages, where their readings have been considered very attractive to numerous and attentive auditories.

"It is also but a bare act of justice to the readers to state, that in addition to the difficulty of selecting pieces, some time and trouble has to be bestowed in studying them, so as to bring out their characteristic points; for no piece, however interesting, can be read in public without much consideration. Besides this, there are few historical or narrative selections that do not require judicious curtailment, and this cannot be effected without very careful and repeated perusals. Oftentimes a piece which would be absolutely wearisome if read in full, becomes in this way a very interesting narrative or tale.

"A few words as to the general character of the readings. They are not intended to be sermons, or moral essays, or scientific disquisitions—but simply means of rational recreation. To make them attractive a certain infusion of the humorous and comic element seems to be indispensable.

"In conclusion, the managers desire to repeat once again, that the main feature which has insured success to the readings has been the furnishing of a variety of readers and readings on the same evening. This is their distinctive characteristic; and when, as in some instances round about, one or two individuals have supposed themselves capable of supplying all that was needed, failure instead of success has been the ultimate result."

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS.

(*Continued from page* 131.)

Pernambuco.—In the northern part of the consulate of Pernambuco have been discovered gold, iron jet, nitrate of potash, carbonate of soda, alum, copperas, plumbago, and amber. It is expected that coal will also be found.

* See *Journal*, Vol. viii., p. 826.

The principal articles of export from the five provinces are sugar, cotton, hides, rum, rice, farinha, tobacco, and many other tropical productions, but in such small quantities that the exportation may fairly be said to be confined to sugar, cotton, and hides. The amount of sugar exported averages betwixt 60,000 and 70,000 tons annually; of cotton, about 17,000,000 lbs.; and of hides, about 500,000.

Baize or coarse oollen cloth, dyed blue, is extensively manufactured in the Equator. A great part of it is exported by land to New Granada, and used by the miners of the coast of Choco and Barbadoes.

Iceland Cod Fisheries.—Upwards of one hundred small vessels, employing about 1,200 or 1,500 men, are annually fitted out at Dunkirk for these fisheries, the value of the produce of which is estimated from £120,000 to £160,000. It is principally used for home consumption, and Paris is the chief mart. What is unsold at the approach of a new fishing season, is dried and shipped to the colonies—and also the Portuguese ports, the French Government according a premium of from 12 to 20 francs per 100 kilos, the amount varying according to destination.

Soap.—Soap is the oldest and one of the most important of the manufactures of Marseilles. This may be ascribed to the position of the town in the midst of the countries producing olive oil. Until of late years, this oil was almost the only one used in the making of soap; but the introduction of seed oils, tallow, hogslard, olive, palm and cocoa-nut oils, which are now so much used, has had the effect of increasing the number of manufactories elsewhere so considerably as to constitute a formidable opposition to those of Marseilles. Accordingly, this manufacture is not progressing; still, Marseilles being the chief mart for olive oil and oleaginous seeds, it does not retrograde. The number of soap manufactories at work in 1855 was 44, employing about 900 workmen. The usual production is about 65,000 tons, absorbing 40,000 tons of oil, whereof 2-3rds is seed and 1-3rd olive oil. The other oily substances are but little used in the Marseilles manufacture.

Crushing-Mills for Oleaginous Seeds.—This manufacture is of recent introduction at Marseilles, being only of about 20 years standing. It originated with the use of seed oil in the manufacture of soap. The first seed-oil employed by soap-boilers was that produced from œillette, grown in the northern departments of France; but, as soon as it was discovered that linseed, sesame seed, and ground nuts, might be substituted, crushing-mills were set up, and in 1855 had attained to the number of 20, turning 425 presses, and employing 1,000 workmen. Besides being used for the making of soap, seed-oils are also in considerable demand for lamps, machinery, and for various other uses; and they now constitute one of the most important manufactures of Marseilles. The following figures represent the quantity of seed oils produced in this city in 1855; the quantity of seed received from Russia in that year was small, compared with that usually furnished *viâ* the Black Sea :—

	Tons.
White Sesame oil	8,000
Indian and African Sesame ditto ...	6,000
Ground Nut ditto	7,328
Linseed ditto	3,878
Poppy ditto	100
Palm ditto	383
Cotton Seed	697
	26,386

Manufacture of Soda and other Chemical Preparations from Sea Salt.—Although this manufacture has been excluded from the town of Marseilles, owing to its insalubrity, it must still be regarded as a Marseilles manufacture, for it is worked by the people of the town, and the greater part of its produce is used in the soap manufactories of the city. The number of soda manufactories is 17, of which ten are in operation. Their principal productions are: 1st.—25,000 tons of carbonate of soda, known in trade by the name of "Soude factice." 2ndly.—10,000 tons of salt of soda. These works produce also sulphate of soda, sulphuric acid, chloride of lime, and other products derived from the chemical combinations of sulphur and sea salt.

Salt Works.—They are at Carry, Ponteau, Bonc, Martigues, Berre, Le Val-duc, Fos, Laroque, and Camargue, places along the coast. These works supply Marseilles with salt, and furnish large quantities for exportation. The number of these works in operation is 19; they employ about 500 workmen, and produce annually about 110,000 tons of salt.

Coral Manufacture.—This manufacture, though long established at Marseilles, has not progressed. The town has three establishments, employing 400 workpeople, and giving an annual return of about £60,000. The reason that this manufacture does not advance is the insufficiency of the coral fishery in the Mediterranean.

ARTIFICIAL PRODUCTION OF ICE.

In a recent number of "Cosmos" the article by Rear-Admiral Sir Charles Elliott,* "On the Preservation of Food," in which he refers to Harrison's apparatus for producing ice, by means of the evaporation and condensation of ether, is noticed. A description is also given of an ice-producing machine invented by M. Carré, in which ammoniacal gas is used, its great feature being that its action is continuous instead of intermittent. The principal parts are—a boiler heated on an open fire, or by steam; a vessel placed above the boiler for the purification of the gas; a tubular condenser, where the gas is liquefied by the action of a current of cold water; a refrigerator of a suitable shape, into which the liquefied gas regularly passes; a vessel into which the gas escapes from the refrigerator, where it is absorbed by water like steam in a condenser, with this difference—that in this apparatus the water must be kept constantly cooled by a current of cold water flowing through a worm, carrying off the latent caloric disengaged by the absorption; a pump which brings back again into the boiler the water which has been saturated with gas; and, finally, a regenerator, in which the water which is to be used for absorption exchanges its temperature with that of the water saturated with gas. The object of the boiler is similar to that of a distilling apparatus, and the separation of the ammoniacal gas from the water is easily effected, as it is not necessary that the water should be entirely exhausted of its gas, since it never entirely leaves the apparatus.

It is, therefore, unnecessary to multiply arrangements for effecting this object. The purification of the gas in the receiver, where the solution arrives at the maximum of concentration, is sufficiently perfect to give good results. The liquefaction of the gas, which is always a little watery, is effected under a pressure of six to seven atmospheres, at a temperature of 25 deg. centigrade. The absorption of the gas by the water is accompanied by a considerable disengagement of caloric, which is equivalent to the cold produced by the caloric absorbed in the refrigerator. The absorption would be impossible at the necessary rate if the solution were not kept constantly cooled by the passing of cold water through the worm arranged in the interior of the vessel. The ammoniacal solution from the boiler is first deprived of the greater part of its gas, and when the apparatus is ready to begin the work of refrigeration, it is already much weakened, more especially towards the bottom of the vessel; but as it still contains a considerable quantity of ammonia, and that there would be besides a greater loss in allowing it to run out hot, it becomes important to render it fit for absorption by exchanging its temperature with that of the saturated water which returns to the boiler.

* See present Vol. of *Journal*, p. 95.

The intensity of the cold that may be produced with this apparatus varies within wide limits, and is determined by the quantity of gas with which the water is charged in the absorbing vessel; the more rapidly it enters this, the more energetic will be the absorption, and the moreintense the cold; by only making it absorb 15 to 20 per cent., the cold will easily reach to — 50 or — 60 deg. centigrade. The water carried off in the form of steam, with the ammoniacal gas, would tend to accumulate in the refrigerator and paralyse its action, but an intermittent or continuous removal of it, with the exchange of temperature between the liquid going out and the liquid coming in, obviates this inconvenience. The exchange of temperature is also effected between the gas which passes very cold from the refrigerator and the liquid which re-enters it at 20 or 25 deg. centigrade. These exchanges are easily arranged by making one of the two conducting pipes wind round the other.

Home Correspondence.

ADULTERATION OF TEA.

Sir,—I beg to hand you the minutes of a meeting held at Canton, in April, 1860, relative to the adulteration of tea, (with correspondence on the subject), upon which the extraordinary statements lately put forward appear to have been erroneously based.

These minutes show that an attempt being made (or perhaps it would be more proper to say being about to be made) to introduce a spurious article into the market at Canton, the leading houses there, whose names are appended to the minutes, at once took the most prompt and decisive measures to nip the fraud in the bud.

I think you will deem it but justice to insert in your forthcoming number of the *Journal* these minutes, which I think myself most fortunate in having obtained from the eminent firm of Peek, Brothers, and Co.

From a practical acquaintance of many years with tea and the tea trade, I will undertake to say, not that seven-eighths are not adulterated merely, but that not one-thousandth part of the tea supply of this country is adulterated.

The wide difference of the two statements is of course startling, but the former one as to the large amount of adulteration originated purely in an error, which I believe the gentleman who made the statement is anxious to have corrected. I am, &c.,

H. C. WHITE.

The following are the minutes referred to:—

Minutes of a Public Meeting of British Merchants, held at Canton, on the 18*th April,* 1860, *for the purpose of devising the best means for putting a stop to the adulteration of Canton made Teas, and the correspondence with H. B. M.'s Consul, together with the Nanhae Magistrates' proclamation with reference thereto.*

Resolutions.

"In consequence of its having been discovered that a large quantity of *false leaf* has been purchased, and is now in preparation for mixing with the new Tayshan and other Canton Teas as they come down, this meeting deem it most desirable to do all in their power to prevent its use; they therefore beg to report the fact to H. B. M.'s Consul, and suggest that it would be most advisable to represent the matter to the Nanhae or other officer, in order that he may issue a proclamation (to be posted in various parts of the City of Canton, at Honam and in the Canton Tea districts) stating that in every case proved against the manufacturers or teamen of using this spurious leaf or any spurious article, in however small a quantity, they will be punished by fine and exposure—and that the broker or brokers offering such spurious matter for sale be held responsible, failing to declare his or their principal."

II. "That a committee be formed to communicate with H. M.'s Consul, and generally to carry out the objects of this meeting."

(A Committee was formed.)

Canton, 24th April, 1860.

The Committee appointed to communicate with H. B M.'s Consul with reference to the Adulteration of Canton Teas, beg to report to the members of the meeting held on the 18th inst., that H. M.'s Consul highly approves of the resolution then passed, and is willing to render his hearty co-operation in the matter,—upon the condition, that this community pledges itself to support him in carrying out the intention of the said resolution by refusing to purchase knowingly any adulterated tea.

The accompanying letter, addressed to H. B. M.'s Consul giving this guarantee, is herewith circulated for signature by the respective firms.

Canton, 24th April, 1860.

Sir,—The Committee appointed at a public meeting held on the 18th inst. to wait upon you with reference to the Adulteration of Canton Teas, having reported that they have had the honour of laying the subject before you, and that you highly approve of the resolution then passed, and are willing to render your hearty co-operation in the matter, upon the condition that the community pledges itself to support you in carrying it out by refusing to purchase any adulterated tea, we the undersigned hereby agree to give you every support in endeavouring to check the practice and put a stop to the system of adulteration by refusing to purchase any false or lie tea.

We have, &c.,

Jardine, Matheson, and Co.	Moul and Co.
Dent and Co.	Lindsay and Co.
Gilman and Co.	Smith Kennedy and Co.
Birley and Co.	Johnson and Co.
Reiss and Co.	J. C. Coutts.
Gifford and Co.	D. W. Mackenzie and Co.
Holliday Wise and Co.	

C. A. Winchester, Esq., H.B.M.'s Consul, Canton.

British Consulate, Canton, 15th May, 1860.

Gentlemen,—I have the honour to acknowledge receipt of your communication relative to the adulteration of tea; and it will give me much satisfaction if the despatch which I propose to address to the Nanhae District Magistrate on the matter should assist in the attainment of your object.

So long as there are foreigners willing, in the hope of profit, to purchase adulterated teas, an entire success can scarcely be looked for. At all events the steps taken will facilitate the protection of the purchaser of genuine teas from the fraudulent introduction of the spurious admixture.

I have the honour to be, Gentlemen,

Your most obedient servant,

CHARLES A. WINCHESTER.

Messrs. Jardine, Matheson and Co., and Others.

British Consulate, Canton, 25th May, 1860.

Gentlemen,—I have to enclose for your information copies of the correspondence of this office with the Nanhae, relative to the adulteration of teas, and of the special order issued to the teamen and others concerned in the trade.

The publication of this document, with the apprehension of proceedings to be based upon it, will, I trust, suffice to protect your interests from fraudulent loss. It will be desirable on your part to direct that more than ordinary care should be used in turning out and examining teas; at the time the general muster is taken that one or more canisters should be sealed both by the tea inspector and broker for reference; and, in event of the tea being discovered at the end of the voyage to be, in spite of these precautions, adulterated, that the brokers in England should be directed to return to China a sealed muster duly authenticated by declaration made in presence of a magistrate.

The circumstances connected with this correspondence lead me to hope that a steady and combined determination to refrain from the purchase of adulterated produce will secure a fair supply of genuine leaf being brought into the market.

At the time your letter was handed to me the Chinese names of three plants used for adulteration were sent to me. Fresh specimens of the leaves were afterwards obtained. The principal, *Lo ti sung kun*, is the *Gynura auriculata*, a recognized drug, largely dried and used by the Chinese in the form of an infusion, which is stimulant and slightly acrid. The second, *Ardisia crispa*, is innocuous; while the leaves brought—as representing the third—proved to be those of a common species of mint.

I have the honour to be Gentlemen,

Your most obedient servant,

CHARLES A. WINCHESTER.

Messrs. Jardine, Matheson, and Co., and Others.

Enclosure 1.

MR. ACTING CONSUL WINCHESTER TO THE MAGISTRATE OF NANHAE.

Canton, 15th May, 1860.

I have now received from the majority of the English merchants a petition, in which they say that lately a great deal of the tea in this locality has been adulterated with other leaves; and that though they would not knowingly purchase such adulterated tea, they fear that it may hereafter be delivered to them for tea that they may purchase from musters of genuine tea, and that heavy loss may thus be entailed on them when the fraud is discovered on the examination of the tea at home. They therefore beg my intervention to get such practices put a stop to.

Now it is not only far from right that the tea-dealers should sell one thing and deliver another; but it is also hard to say that if adulteration be allowed, the adulterating substances may not sometimes be of a kind deleterious to health. I have therefore to request that you will summon the tea-brokers before you, and give them the strictest warnings on this subject; and issue a proclamation stating that any persons hereafter detected in such malpractices will not only have to make good any losses that they may have caused to the purchasers of the tea, but will in addition be criminally punished with the utmost severity.

Trusting that you will see the expediency, in a public point of view, of the course thus pointed out for calming the apprehensions of the merchants, and putting a stop to wrong doing,

I have &c.

Translated by

(Signed) W. H. PEDDER, Interpreter.

True Copy. WM. M. COOPER.

Enclosure 2.

THE NANHAE MAGISTRATE TO MR. ACTING-CONSUL WINCHESTER.

Canton, 21st May, 1860.

I am in receipt of your official communication, in which you say [here is quoted the acting Consul's letter to him of the 15th instant].

Receiving the foregoing I beg to inform you that I have given orders to ex-Hong Merchant Woo E-ho, &c., &c., to make known to all tea-merchants and brokers that any persons selling adulterated teas as genuine will on discovery be liable to punishment, as well as for the reimbursement of any losses that may have been caused by such fraudulent act.

Translated by

(Signed) W. H. PEDDER, Interpreter.

True Copy. WM. M. COOPER.

CHOO, ACTING MAGISTRATE OF THE DISTRICT OF NANHAE GIVES INSTRUCTIONS FOR THE INFORMATION OF THE EX-HONG MERCHANT WOO E-HO, &c., &c.

I have now received from the English Consul the following official communication [here is quoted the Acting Consul's letter].

Receiving this I have accordingly to issue orders, on the receipt of which you will make it known to all persons at Canton connected with the Tea trade that hereafter any one dealing in this article with foreign merchants must in every case pack teas for delivery of the exact kind and quality of the muster by which they were sold; and that such abuses as clandestine mixing up of spurious tea (with the genuine) will not be permitted. That if, after this declaration any tea merchant shall not conduct himself aright in these respects, he will, as soon as discovered or informed on, be certainly proceeded against for the damages and losses that may have been sustained, and visited with due punishment. And that none will then be able to say that they were not previously warned.

And you will be careful to impress the foregoing orders on the parties concerned, so that such shall understand them.

Pressing! Pressing! A Special Declaration!

Translated by

(Signed) W. H. PEDDER.

True Copy. WM. M. COOPER.

ADULTERATION OF FOOD.

SIR,—I intended to have made a few observations last night, respecting the able and interesting paper read by Mr. Wentworth Scott, but the great number of speakers and the lateness of the hour prevented me from doing so. The discussion appears to me to have borne almost entirely on the tea question, which more properly appertained to last week's paper, whilst the real question at issue, viz., the adulteration of food in general and the means to prevent it, seemed to have been somewhat neglected. That this adulteration exists more or less, I think no one can deny, but the means to put a stop to it ought, I think, to have called forth more attention. As Mr. Scott observed, it is principally the poor man who suffers from the above; in the low and cheap neighbourhoods nearly all edibles and drinkables offered for sale are adulterated, for the sake of dishonest gain, or invidious competition. The fact is, that most things are offered at impossible prices, and such prices can only be maintained by selling trash. Now, what is to be done? No doubt Dr. Hassall's exposures in the *Lancet* have done some good, and Mr. Scott's paper will likewise produce beneficial results, but I am afraid neither of them will reach and enlighten the principal victims, the lower classes. And if they did, what are they to do, surrounded as they are with shops selling wares all equally bad, and having no means nor opportunities of supplying themselves at a better market. The only remedy I think practicable is, that Government should appoint a staff of active and efficient inspectors, whose duty would be to visit these shops, take samples of what they sell, have them examined, and punish with fine and even imprisonment those who are found guilty of retailing any articles adulterated with deleterious drugs. To this may be objected, that the tradesman may not be aware that he is selling anything injurious, but in that case, let him give up his authors, and it will soon reach the really guilty party. That is the system they adopt in France. There I have seen adulterated milk upset in the street by the inspectors, and sophisticated wine allowed to flow into the gutter; whilst here our milkmen are allowed to carry about their chalky abominations without fear of any prying glance, and our publicans may drug and poison us as they please.

Some will say that this is a free country, where people do not like to be interfered with; but I may reply, that in such a case liberty degenerates into licence, and that we have a right to expect from government the same protection against the man who poisons us slowly with his deleterious wares, as we would have against the assassin who murders us at one blow. I am, &c.,

EUGENE RIMMEL.

96, Strand, 31st Jan., 1861.

SIR,—Not having had an opportunity last Wednesday of offering a few remarks on Mr. Scott's paper, "On the Adulteration of Food," I shall feel obliged by your giving publicity to the following lines in the *Journal*.

Undoubtedly a great service is done by chemists in tracing all possible adulterations, especially those hurtful to human life, and in making the public familar with the sometimes very simple means of detecting these adulterations; but, productive and valuable as these endeavours are to protect and to improve public health, I think we cannot be too careful in drawing a proper and clear distinction between fraudulent adulteration and accidental impurity, or in denouncing as an adulteration any foreign matter brought to light by a single chemical reaction.

I cannot help thinking that in this regard Mr. Scott treated his subject in too light a manner, that he is too much inclined to take an exception as the rule; a remark which I am led to make in consequence of Mr. Scott's alarming statement of the adulteration of bread.

He states that sulphate of copper is used in Austria to improve the quality of bread, and that in London alum is used to the extent of 87 per cent. of bread.

But statements of such grave character should not go forward without the addition of a most substantial proof, or of the exact quantity of the adulterant found by careful analysis. All our works on technical chemistry invariably

tell us, under the article "bread," that in England alum is added to bread, and sulphate of copper on the continent. But is this really the case? On the occasion of Dr. Dauglish's paper the opinion was strongly expressed that the bakers did not use alum to the extent generally believed; and if my memory serves me right, it was then that Dr. Odling stated that out of 64 samples of bread, obtained from various shops in Whitechapel, not a single one was found to contain alum. Surely a striking difference between Whitechapel and Chelsea! In regard to the sulphate of copper, I must add, that when at Prague, about eight years ago, I tested a great many samples of bread for this poisonous substance, but not in a single instance did I detect a trace of it, and I also have the authority of one of the most respectable bakers at Vienna, a proprietor of one of the largest businesses, that this adulteration is utterly unknown in Austria. Everbody recollects the outcry and panic in 1852, that our bitter ale was adulterated with strychnine, and the results of professors Graham and Hofmann's subsequent examination of a variety of samples, showing how utterly unfounded was all fear on this account; and I believe that many articles, against the use of which we now are warned, would appear as free from adulteration as that beer was, if we made a just distinction between adulteration and accidental and harmless impurity. I am, &c.,

FRED. VERSMANN, F.C.S.
Consulting and Analytical Chemist.

7, Bury's-court, St. Mary-axe, E.C., Feb. 6th, 1861.

Sir,—Up to the present moment I have purposely refrained from offering any reply to the protracted discussion upon my second paper on the above subject, wishing, first, to give an opportunity for others to record their opinions in the *Journal*.

I may now more appropriately make a few additional observations, as several letters in the last *Journal* show sufficiently that my results are *not* "exaggerated," but are, if anything, rather *under* the mark, as regards the extent to which adulteration is carried at the present time, and that, in the opinion of really competent authorities, the remedies which I have suggested, instead of being "of the most futile kind," would go a great way towards suppressing the evil, if carried out in an efficient and comprehensive manner.

To the very strongly expressed opinions of Mr. W. Hawes, which, under other circumstances, I might not notice, I am prepared to give respect and attention, as they are those of a member of the Council of the Society; but when it is deliberately stated that certain statements of mine are either "entirely false" or else are "gross misrepresentations," I am bound, in furtherance of one of the chief objects of the Society—the eliciting of *truth*—to deny such assertions in the most solemn and emphatic manner.

If Mr. Hawes, in place of resting his belief in a biassed and ill-founded idea, would take the trouble of purchasing 1,000 loaves of bread at as many different bakers in various parts of London, and of having the said loaves carefully examined, his opinion would speedily be changed, as fully one-fourth of the total number would be found repulsive to an ordinarily discriminating palate, while, after more accurate testing, more than the prescribed 870 loaves would afford evidence of being more or less adulterated or sophisticated in one way or another.

The peculiarity of the argument, which requires that a case of fraud perpetrated at the Wakefield cattle-market should be proved by bringing a sack of corn bought in Mark-lane into the meeting-room of the Society, is too plain to need any comment.

I must next protest against my being considered responsible for statements made by the author of the paper preceding mine, as implied by Mr. Hawes. So far from believing that seven-eighths of the tea, as imported into this country is adulterated, I distinctly said (*vide Journal*, page 159, col. 2) that of the black teas sold retail in London, the total number of adulterated samples,—that is the Chinese and British adulterations put together—is about 61, and of the green teas 78, in each 100 specimens.

If, therefore, of the teas sold retail in this metropolis (according to my analytical results), much less than seven-eighths is found to be adulterated, it is evident that the article as imported, and before it has been tampered with by shopkeepers, must be adulterated in a still smaller proportion.

Contrary to the avowed opinion of Mr. Hawes, exaggeration is what I have all along specially endeavoured to avoid; the main facts are quite bad enough, without magnifying them, and consequently I have, throughout the Table showing the average per cent. of adulterated samples, made the figures representing the same rather lower than actual analytical researches exhibit, in order to be on the safe side.

If I had wished my paper to partake more of the marvellous and startling in its character, I could easily have narrated instances of adulteration "on the best authority," which would have seemed perhaps in some degree to warrant the severe criticisms of Mr. W. Hawes, but such was *not* my object, as I hold that all communications made to any Society whose objects are of that practical and extended nature which characterises the Society for the Encouragement of Arts, Manufactures, and Commerce, should give nothing as facts but what may fairly come under that denomination—should give hypotheses as hypotheses, for whatever they may happen to be worth—and should rigidly exclude everything like an undue straining at a dictional or semi-dramatic "effect," if calculated in the slightest degree to mislead the public or create a false impression.

Now, I have often been assured that horses' fat is used for adulterating butter, that the baked liver of various animals is employed to falsify coffee and chicory, &c.; but such tales I do not credit, for the simple reason that the supply of the adulterant would be far too limited. Of course, exceptional instances will now and then occur—a man dealing in articles of food may by chance come into possession of some waste product or other, which he may use while it lasts for an adulterant. Such, however, cannot be legitimately considered as a usual or ordinary species of adulteration. I have studiously omitted adulterants of such doubtful character in my paper, for the reasons given before.

The part of Mr. Hawes's speech, however, which has excited the greatest surprise is that which ridicules the idea of appointing a Committee from the Society itself on the adulteration of food and drink. To hear such an observation from anyone at all acquainted with the Society of Arts would astonish us greatly—but how much more so when that observation emanates from a member of the Council? The undoubted success and utility of many Committees of the Society is so well-known that it is quite needless to dilate upon the same, but taking the vitally-important subject of the purity of our daily food—that food upon which the physical strength of millions, the mental force of thousands, and the general health and comfort of all of our countrymen, depends—all other questions must instantly sink into comparative insignificance. If the opportunity is afforded me, I shall at another time have great pleasure in explaining in a detailed manner under what circumstances the Special Committee I have suggested should be appointed, and in what way it might be rendered really efficient—an honour to the Society and a benefit to the public. Meanwhile I content myself with respectfully but most earnestly urging the Council to give the question that grave consideration which the public at large, and I believe the bulk of the Society, expect them to accord, however large and (apparently) difficult may be the object to be accomplished, or however humble the forefinger that first points the way.

As to the public being able to "take care of itself," when I am told by anyone, not an inmate of Colney Hatch or other similar establishment, that the public can protect

itself against burglars and pickpockets without any police; that it can prevent forgeries and embezzlements without the assistance of the legislature; that it can keep in health without any aid from physicians; and the country could best prepare for invasion by disbanding its army and destroying the fleet; then, and not till then, can I or anyone believe that the public can protect itself against the universal system of adulteration now evident throughout the land, without the slightest help from the government or from science.

If I am right in believing that Mr. Malone is of opinion that tea and tobacco can be so ingeniously adulterated that detection is impossible, I beg here to record that I entirely disagree with that opinion.

Mr. R. Temple's remarks upon cayenne pepper I can fully corroborate.

Mr. Tufnell has rightly interpreted my motives in giving a few simple tests for adulterants for the public generally. From none of them (in inexperienced hands) should an adulterant be stated decidedly, in a court of justice, to be present; but from their general behaviour anyone may form an opinion as to whether he had better cause the article tested to be regularly analysed and proceed with the case or not. As water will *not* separate from a mixture of that fluid and milk, Dr. Wyld's "test" is either a typographical mistake, or is itself entirely erroneous in principle.

I am, &c.,
WENTWORTH L. SCOTT.

Bayswater, Feb. 12, 1861.

WATER SUPPLY OF LONDON.

Sir,—In the discussion at your last meeting, "On the present Condition of the Water Supply of London," in answer to a question from Mr. Braithwaite, I am reported to have stated that the net profits of the Plumstead, Woolwich, and Charlton Consumers Pure Water Company, amounted to £3,700 last year. This is a mistake. What I really said was, that from the 31st December, 1859, to the 31st December, 1860, according to the return made to me by the Superintendent of the Works (Mr. Haines), the gross income of the Company amounted to £3,700, and the working expenses, rent, taxes, &c., to about £2,200, thus leaving £1,500 profit.

In the above paper, in allusion to the supply of water obtained from the chalk by the Plumstead, Woolwich, and Charlton Consumers Pure Water Company, it is stated that "at Woolwich it is true that the Plumstead Company were obliged to sink or to bore to a maximum depth of 525 feet before they could get even a small supply of water," &c. Now this statement, no doubt unintentionally, is quite inaccurate. The Company derive their supply of water from the chalk, partly from long adits or small tunnels driven in the chalk from near the bottom of the well, and partly from two bore holes. The tunnels are from 8 to 10 feet high, and 6 feet wide, and the bottoms of these tunnels are situated at a depth of only 30 to 40 feet below ordnance datum or the mean level of the sea. The two bore holes, one about 6 inches diameter, and the other 18 inches diameter, are sunk to a depth of about 540 feet below the level of ordnance datum. The adits or tunnels yield a large supply of water, as well as the bore holes, and water of the same quality is readily procured either by tunneling or by borings. I may add that the water, both from the tunnels and the bore holes, rises to the level of ten feet above ordnance datum; that the present tunnels and bore holes yield about 1,200,000 gallons per day, and the quantity now yielded can be readily increased to a very large extent whenever this may be required. I am, &c.,

SAMUEL COLLETT HOMERSHAM.

19, Buckingham-street, Adelphi, Feb. 13th.

Sir,—Observing in a paper "On the Present Condition of the Water Supply of London," by Mr. G. R. Burnell, published in the Society of Arts *Journal* of the 8th inst., a statement that "the softened water of the Plumstead Waterworks Company acted very rapidly indeed upon the lead cisterns and services exposed to it," and such a statement being so contrary to what is truly the case, you will perhaps allow me space to contradict it.

I have made a great many very trying experiments with this softened water upon lead, and have found it to have scarcely any action whatever upon that metal, practically no action; indeed it may be almost taken as a rule that water submitted to the softening process of Dr. Clark will not act upon lead, and this is the case even with many waters, which, before the process had been applied to them, would have so acted. I speak without hesitation, from having made a vast number of experiments into numerous waters, and varying in quality. I am, &c.,

DUGALD CAMPBELL.

Analytical Chemist to the Brompton Hospital, &c.

7, Quality Court, Chancery Lane, Feb. 13th, 1861.

THE LATE EARL OF DUNDONALD AND THE SPEED OF STEAM SHIPS.

Sir,—Any reminiscence suggestive of the genius and daring of Admiral the late Earl of Dundonald will now, doubtless, be regarded with historic interest, if not as of present public importance; I therefore beg to record that when in conversation with the late Earl of Dundonald, in 1848, I mentioned that the *Banshee*, a vessel built for the Irish Mail Service, and just then tried, had attained the then unprecedented speed of 16 knots or 18½ statute miles per hour, his lordship immediately replied, "Had I the command of such a vessel I would carry no guns: I would run up alongside of and board every ship that I could catch." On this principle of procedure, by thus entirely or in great measure dispensing with the weight of armament, and appropriating it to engine-power, whereby the utmost speed may be obtained by an invulnerably armoured or otherwise unsinkable ship, naval warfare, notwithstanding modern ordnance, may yet be reduced to its nominal condition of personal prowess, so congenial to the qualifications and taste of British seamen as exemplified by Nelson's capture of the *San Josef*, the late Lord Dundonald's capture of the *Gamo*, and by numerous other examples with which the naval history of Britain abounds. Take, for example, such a vessel as the *Warrior*, of 9,000 tons load displacement. Assuming the data of her construction and equipment as published in the *Times* of 29th December last to be correct, if 1,070 tons be taken from her armament of 1,500 tons, still leaving 430 tons of armament, and applied to increasing her engine-power from 950 tons weight up to 2,020 tons, the speed of the vessel would then be increased, from the present contemplated speed of 14 knots up to 18 knots per hour; and with the present supply of 950 tons of coal the steaming endurance of the vessel would be as follows:—

At 10 knots per hour the consumption of coal would be 55·6 tons per day, lasting 17 days.

At 12 knots per hour the consumption of coal would be 96 tons per day, lasting 10 days.

At 14 knots per hour the consumption of coal would be 152 tons per day, lasting 6¼ days.

At 16 knots per hour the consumption of coal would be 228 tons per day, lasting 4 days.

At 18 knots per hour the consumption of coal would be 324 tons per day, lasting 3 days.

I am, &c.,
CHAS. ATHERTON.

Woolwich Dockyard, Feb. 7th, 1861.

BOILER EXPLOSIONS.

Sir,—Many of the accidents incident to steam boilers happen at the moment of starting, as well as at the instant of relieving the safety valve when the steam has unduly accumulated. No satisfactory explanation of the cause of this class of phenomena has ever yet been offered, but, although the cause may be unknown, the remedy is self-

evident. That is to say, it will be merely necessary to provide an exit for the steam, of some certain magnitude, that shall be invariably open during the whole time of inaction, when the regulator is shut; and affording a regular and continuous flow of steam from the boiler during the interval of rest of the engine.

It is highly probable that the spheroidal state which water assumes under variable and capricious circumstances, is at the bottom of those explosions which take place on starting the engine, or relieving the safety valve to allow of the escape of a super-abundance of steam.

This remedy will, of course, have no effect in the ordinary and normal cases of explosions from defective boiler plate, excessive steam pressure, or redhot plates from stoppage of feed, causing the decomposition of the water when re-admitted. I am, &c.,

HENRY W. REVELEY.

Poole, February 4th, 1861.

MEETINGS FOR THE ENSUING WEEK.

MON. ...Architects, 8. Mr. T. L. Donaldson, "Description of Mons. Mariette's Excavations at Ghizeh and Saccara; Some Observations upon the Domestic Architecture of the Ancient Egyptians as existing among the present Arabs; and an Account of Catacombs at Alexandria, recently discovered;" being Notes made during a recent visit.

TUES. ...Royal Inst., 3. Professor Owen, "On Fishes."
Statistical, 8. Mr. F. Jourdan, "On the Effects of Gold Supplies on the Foreign Exchanges, and on the price of Silver."
Civil Eng., 8. Mr. Francis Fox, "On the Results of Trials of varieties of Iron Permanent Way."
Pathological, 8.

WED. ...London Inst., 7.
Geological, 8.
Society of Arts, 8. Mr. George Ledger, "On the Alpaca, and its introduction into Australia."

THURS...Royal Inst., 3. Professor Tyndall, "On Electricity."
Chemical, 8. 1. Dr. Thudichum, "On Putrefaction of Bile, and Formation of Gall-stones." 2. Dr. Guthrie, "On Bisulphide of Iodine." 3. Mr. Adie, "On Ground Ice."
Linnæan, 8.
Antiquaries, 8½.
Royal, 8½.

FRI...... Royal Inst., 8. Professor Faraday, "On Platinum."

SAT. .....Royal Inst., 3. Dr. E. Frankland, "On Inorganic Chemistry."
Botanic, 3¾.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, February 8th*, 1861.]

Dated 5th December, 1860.

2988. C. J. Dumery, 29, Boulevart St. Martin, Paris—A new or improved apparatus for extracting from water or any liquid the bodies in dissolution or in suspension contained therein.

Dated 14th December, 1860.

3080. H. Barber, Belgrave, Leicestershire—Imp. in lamps used in mines.

Dated 17th December, 1860.

3099. M. Henry, 84, Fleet-street—Imp. applicable to fishing nets. (A com.)

Dated 18th December, 1860.

3113. J. H. Johnson, 47, Lincoln's-inn-fields—An improved compound felted and textile fabric. (A com.)

Dated 20th December, 1860.

3128. T. Sykes and B. C. Sykes, Cleckheaton, Yorkshire—Imp. in furnaces.

Dated 26th December, 1860.

3160. F. Warren, Birmingham—Imp. in the machine used for cleaning cotton, and commonly called a "churka," or "roller gin."

Dated 28th December, 1860.

3182. W. E. Newton, 66, Chancery-lane—Improved machinery to be used in the manufacture of paper. (A com.)

Dated 4th January, 1861.

19. G. Lowry, Salford—Imp. in machinery for heckling flax and other fibrous materials.

Dated 5th January, 1861.

39. J. Hamilton, Glasgow—Imp. in governors for regulating the speed of steam and other engines.

Dated 8th January, 1861.

48. P. E. Chassang, 9, Rue du Conservatoire, Paris—An improved buckle. (A com.)

Dated 9th January, 1861.

53. W. Taylor, Nursling, near Southampton—A combined heating and ventilating pipe, to be made elliptically or otherwise.

Dated 10th January, 1861.

61. M. F. Halliday, 4, Langham-chambers, Langham-place, Westminster—An improved trigger for gun locks.

Dated 11th January, 1861.

70. C. Senior, Huddersfield—Imp. in machinery or apparatus for tentering or stretching and drying woollen or other textile fabrics, also for drying warps, yarns, or fibrous substances.

84. A. M. Foote, New York, U.S.—An improved lock for receiving and securing umbrellas, canes, and similar articles.

Dated 12th January, 1861.

90. T. Warwick, Birmingham—Imp. in governors for steam and other engines.

98. G. Franci, 29, Boulevart St. Martin, Paris—Imp. in cannon and mortars and in projectiles for the same.

Dated 16th January, 1861.

129. R. W. Swinburne, South Shields—Imp. in the manufacture of plate glass, and in furnaces employed therein.

Dated 17th January, 1861.

134. M. F. Cavalerie, 29, Boulevart St. Martin, Paris—Imp. apparatus for obtaining motive power by centrifugal force.

Dated 19th January, 1861.

146. W. Crozier, Witton Gilbert, Durham—Imp. means of communication on railways for the prevention of accidents.

Dated 21st January, 1861.

160. W. Pickstone, 32, York-street, Manchester—Imp. in trucks or waggons for carrying coals.

162. W. Pickstone, 32, York-street, Manchester—Imp. in apparatus for discharging water from steam pipes.

164. H. Hibling, 14, Blomfield-street North, Kingsland-road—Imp. in the manufacture of high boots, gaiters, knickerbockers, leggings, and other such articles.

Dated 22nd January, 1861.

168. C. Duckworth, Pendleton, Lancashire—An improved mode of manufacturing fabrics for useful and ornamental purposes.

172. E. Ellis, Bangor, Caernarvon—Improved machinery or apparatus for picking and cleaning "oakum," and for spinning or twisting the same for the purpose of calking ships or vessels.

174. H. R. Cottam, St. Pancras Iron Works, Middlesex—Imp. in folding chairs, cots, and such like articles to sit and recline on.

Dated 23rd January, 1861.

178. D. Smithies, Rochdale-road, Manchester, and J. Jackson, Holyrood-terrace, Queen's park, near Manchester—Imp. in the manufacture of healds or harness for weaving.

179. W. Westley, Northampton—Imp. in the manufacture of boots and shoes.

180. W. Brown, Wigan—An improved stripper of carding for carding engines.

181. W. Clark, 53, Chancery-lane—Imp. in thrashing machines. (A com.)

182. W. Clark, 53, Chancery-lane—Imp. in circular looms for weaving hats and other articles. (A com.)

183. W. Clark, 53, Chancery-lane—Imp. in ships' sails. (A com.)

184. J. Deakin, Birmingham, and J. Cresswell—Certain imp. in shutters.

185. W. Wilson, Newcastle-upon-Tyne—Imp. in the manufacture of hats.

166. A. Prince, 4, Trafalgar-square, Charing-cross—An improved induction and eduction valve for steam engines.

187. R. A. Brooman, 166, Fleet-street—Imp. in sewing machines, particularly applicable to the stitching or sewing of gloves and other articles where circular or partially circular parts are to be connected together. (A com.)

Dated 24th January, 1861.

188. T. Haworth, Nut Mill, Bacup, Lancashire—Imp. in machinery or apparatus for governing or regulating the speed of steam engines or other motive power.

189. H. Henderson, Edinburgh—Imp. in machinery or apparatus for printing yarns or threads, part of which machinery or apparatus is applicable to the twisting of fibrous materials.

191. R. Thomas, Bath-street, Tabernacle-square, Midelesex—Imp. in tires of wheels for vehicles used on common roads.

192. Col. H. D. O'Halloran, Kensington—An improved sporran or excursion bag especially suitable for volunteer riflemen and tourists.

193. G. T. Selby, Smethwick, Staffordshire—Imp. in the construction of masts and posts.

194. T. Gibson, Staveley Works, Derby, and W. Knighton and H. Knighton—Imp. in core barrels for casting pipes, cylinders, retorts, and other like hollow articles.

195. D. J. Fleetwood, Birmingham—Imp. in apparatus for rolling metal.

196. W. Longmaid, Inver, Galway, Ireland—Imp. in the manufacture of iron and steel.

Dated 25th January, 1861.

199. E. F. Hughes, 123, Chancery-lane—Imp. in machinery or apparatus for pulverising clay and other materials. (A com.)

200. G. Hadwen, Audenshaw, Lancashire—Imp. in the double lift jacquard machine as applicable to power looms.
201. R. A. Brooman, 166, Fleet-street—Imp. in reaping and mowing machines. (A com.)
202. S. Needham, Oriel-place, Chelsea—Improved spring apparatus applicable to bedsteads and other articles to which springs may be applied.
205. A. F. Yarrow, Arundel-square, Barnsbury, and J. B. Hilditch, Barnsbury-villas, Middlesex—Imp. in means or apparatus used in ploughing, tilling, or cultivating land.
206. C. Lungley, Deptford-green Dockyard—Imp. in the construction of ships and other vessels for war purposes.

Dated 26th January, 1861.

207. J. Durrant, Fitzroy-square, and N. A. Harris, Bayswater, Middlesex—Imp. in the form and construction of chimney tops or appliances for surmounting chimneys, in order to regulate the up currents and obviate the down draughts.
208. C. Bishop, St. Helen's, Lancashire—Imp. in the ornamenting of glass.
209. C. A. Drevet, 4, South-street, Finsbury—Imp. in the manufacture of sulphurous acid, sulphites, bi-sulphites, and sulphuric acid, and in the apparatus employed therein, and in the application of one of the products of such manufacture to the bleaching of textile, animal, and vegetable substances.
210. T. Bradford, Manchester—Imp. in machines for washing, rinsing, and blueing clothes, fabrics, yarns, and similar articles.
211. F. W. Webster, Whitstable, Kent—Improved apparatus applicable for washing and churning.
213. R. Mushet, Coleford, Gloucestershire—An imp. or imps. in the manufacture of melting pots or crucibles.
214. J. Arrowsmith, Bilston, Staffordshire—Imp. in the manufacture of armour plates for gunboats and land batteries, and in machinery and furnaces used in the said manufacture.
215. G. Hallett, 52, Broadwall, Lambeth, and J. Stenhouse, 17, Rodney-street, Pentonville—Imp. in the manufacture of pigments for coating surfaces.
216. H. Bessemer, Queen-street-place, New Cannon-street—Imp. in ordnance and projectiles.

Dated 28th January, 1860.

217. J. Clark, 28, Harleyford-place, Kennington—The application of a paste of whatever wood to any kind of ornamental and other mouldings, without the least admixture of any other materials, or use of any chemical agent. (A com.)
219. C. De Bergue, 9, Dowgate-hill—Imp. in machinery for shaping metals.
221. H. W. Hart, 3, Rue Bergère, Paris—Imp. in gas burners.
223. G. A. Rothholz and M. Rosenthall, 14, Goulston-street, Whitechapel—An improved combined garment for gentlemen's wear.
225. W. E. Newton, 56, Chancery-lane—An imp. in dinner-plates. (A com.)
227. J. G. Mason, Ironmonger-street, Stamford, Lincolnshire—Imp. in chimney tops.

Dated 29th January, 1861.

231. E. W. Furrell, Kensington—An improved means of communication between the guard and the engine driver of a railway train.
233. W. F. Fleming, Halifax, Yorkshire—An imp. in "bottle cleaners."
235. J. H. Ashford, Loxbeare, Tiverton—Imp. in signals for communicating between the passengers of railway trains and the engine-driver and guards.
237. R. Culverwell, Plymouth—Improved apparatus for obtaining motive power or communicating motion to machinery.
239. C. E. Crawley, 17, Gracechurch-street, and T. Schneider, 74, Horseferry-road—Imp. in safety and other lamps.

Dated 30th January, 1861.

241. A. Courtois and J. E. de Soulange, Paris—Improved construction of kiln for baking bricks, tiles, or other similar articles.
243. S. T. Crook, Halifax, Yorkshire—Imp. in the construction of boilers employed for warming buildings.
245. W. Archer, Bolton, Lancashire—Certain imp. in jacquard machines.
247. J. Poole, Bletchley, Buckinghamshire, and J. Wright, 42, Bridge-street, Blackfriars—Imp. in steering or guiding steam or other vessels, and also in working or actuating their rudders.
249. H. Phillips, Pinhoe, Devonshire, and J. Bannehr, Exeter—Imp. in urinals, and the manufacture of manure when urine is used.
251. G. T. Bousfield, Loughborough-park, Brixton—Imp. in the manufacture of shoes for horses and other hoofed animals. (A com.)
253. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the construction and internal arrangement of railway carriages. (A com.)
255. W. Clark, 53, Chancery-lane—Improved spring hinges. (A com.)

Invention with Complete Specification Filed.

265. T. Lemeille, 51, High Holborn—Engines for the extraction of the produce of mines, and new arrangement of the ropes for suppressing all dead weight.—1st February, 1861.

Patents Sealed.

[*From Gazette, February 8th*, 1861.]

February 7th.

1903. F. Hudson.
1904. J. Bonne.
1905. C. L. Davies.
1908. R. A. Brooman.
1912. E. M. Thornton.
1914. R. A. Brooman.
1915. R. A. Brooman.
1917. F. Davidson.
1921. J. Barlow.
1923. M. Dodds.
1924. E. Smith.
1927. D. F. Grimaldi.
1928. H. Earle and W. Earle.
1929. H. Cockey & F. C. Cockey.
1943. J. Giles.
1950. T. Hart.
1951. C. P. E. Poussier.
1956. J. Stuart.
1965. N. Wehnert.
1966. J. Lark.
1968. E. Wroughton & T. Holmes.
1979. W. Walton.
1997. A. Pirotte.
2047. W. Thomson & F. Jenkin.
2096. J. H. Johnson.
2160. J. S. Travis.
2195. C. Cowper.
2733. W. Cooke.
3067. J. R. Cooper.

[*From Gazette, February 12th*, 1861.]

February 12th.

1954. S. Norris.
1955. H. Hewetson.
1963. J. Billing.
1969. R. D. McKibbin.
1971. H. Courtot.
1972. W. Jenkinson.
1976. W. Holms and J. Oldfield.
1978. P. A. Godefroy.
1982. J. Samuel and G. F. Train.
1985. W. Petrie.
1987. T. Mellodew and C. W. Kesselmeyer.
1988. J. J. Coleman.
2001. W. H. Crispin.
2003. R. Romaine.
2004. F. B. Houghton.
2005. T. Grahame.
2009. E. Bridgman.
2015. E. Hall.
2017. A. M. Perkins.
2031. C. Weiss.
2033. J. H. C. Lacroisade.
2048. G. Davies.
2055. R. Jobson and R. J. Ransome.
2068. J. Bingley.
2073. H. Marriott.
2077. B. Hirst.
2092. H. Mège.
2093. A. A. Beaumont.
2217. N. Rosinsky.
2224. J. H. Johnson.
2251. A. V. Newton.
2257. G. F. Smith.
2608. F. S. Barff.
2878. T. Gamble and E. Ellis.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, February 8th*, 1861.]

February 4th.

246. E. Stevens.

February 5th.

239. W. Brown and C. N. May.
279. W. Spence.

February 6th.

233. R. W. Johnson and W. Stableford.

[*From Gazette, February 12th*, 1861.]

February 7th.

242. E. Leigh.
300. J. E. Boyd.
390. D. Nurse, R. Nurse, and G. Nurse.

February 8th.

245. R. Carte.
252. J. Chatterton.
257. G. A. Barrett, W. Exall, and C. J. Andrewes.

February 9th.

250. R. Aytoun.
255. L. Cass.
288. W. Cope.

Patefts on which the Stamp Duty of £100 has been Paid.

[*From Gazette, February 8th*, 1861.]

February 5th.

428. E. Massey.

[*From Gazette, February 12th*, 1861.]

February 7th.

325. B. H. Hine, A. J. Mundella, and L. Barton.

February 8th.

328. H. Warner, J. Haywood, and W. Cross.

February 9th.

332. W. Whiteley.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Registry.	Date of Registration.	Title.	Proprietors' Name.	Address.
4327	Jan. 17.	The Alpha Tie and Collar	Alexander Grant and Bros. ...	Clement's-court, Wood st., Cheapside.
4328	,, 18.	Air Furnace for melting and refining iron...	John Clayton	Wolverhampton.
4329	,, 18.	Crib-biting and wind-sucking preventor ...	John Cassidy	Dublin.
4330	,, 21.	Fire Lighter making machine	James Adams	47, Alfred-road, Westbourne-park, W.
4331	,, 28.	The Commissionaire's Porte Circular	Capt. Edward Walter	Army and Navy Club, S.W.
4332	,, 30.	Sash Fastener	Lingham, Bros...	Birmingham.
4333	Feb. 11.	Lamp Burner...	Gray, Bailey, and Bartlett ...	Ditto.
4334	,, 11.	The Elcho Rifle-firing Rest	Francis Charteris, Lord Elcho, M.P.	St. James's-place, S.W.
4335	,, 11.	Break Spring	Robert Watson	40, Walton-street, Chelsea, S.W.

Journal of the Society of Arts.

FRIDAY, FEBRUARY 22, 1861.

INTERNATIONAL EXHIBITION OF 1862.

The following is a copy of the Charter which Her Majesty has been graciously pleased to grant, incorporating Earl Granville, K.G., the Marquis of Chandos, Mr. Thomas Baring, M.P., Mr. C. Wentworth Dilke, and Mr. Thomas Fairbairn, as the Commissioners for the Exhibition of 1862:—

Victoria, by the grace of God of the United Kingdom of Great Britain and Ireland, Queen, Defender of the Faith, to all to whom these presents shall come, greeting: Whereas, the Society for the Encouragement of Arts, Manufactures, and Commerce, incorporated by Charter under Our Great Seal, bearing date at Westminster the 10th day of June in the tenth year of Our reign, and whereof Our most dearly beloved Consort is President (and which Society is hereinafter referred to as the Society of Arts), did previously to the year 1851 establish and cause to be held from time to time exhibitions of the products of industry and art, which exhibitions resulted in, or conduced to, the holding of the Exhibition of the Works of Industry of all Nations, in the year 1851, and which last-named Exhibition was attended with great success and public advantage: And whereas the said Society, in order to promote the objects for which it was incorporated, is desirous that facilities should be afforded for holding from time to time International Exhibitions of the products of Industry and Art, and it hath been represented to Us by the said Society that many of its members and others of Our loving subjects, are desirous that such an International Exhibition should be holden in the Metropolis in the year 1862, or so soon after as conveniently may be, and the said Society is desirous that the entire control and management of such Exhibibition shall be confided to the Right Honourable Granville George Earl Granville, Lord President of Our Council, and Knight of Our most noble Order of the Garter, the Right Honourable Richard Plantaganet Campbell Temple Nugent Brydges Chandos Grenville, commonly called Marquis of Chandos, Thomas Baring, Esq., M.P., Charles Wentworth Dilke the younger, Esq., and Thomas Fairbairn, Esq., who are willing to undertake the duty of conducting such Exhibition, provided that the holding thereof be approved by us, and that we should be willing to grant to them our Charter of Incorporation, to enable them to conduct and manage the same: And whereas, it hath also been represented to Us that it is essential to the success of such undertaking that We give Our sanction thereto, in order that it may have the confidence not only of all classes of Our subjects, but of the subjects of foreign countries, and for such objects, as well as for other the purposes herein appearing, the said Society hath besought Us to authorise the said Earl Granville, the Marquis of Chandos, Thomas Baring, Charles Wentworth Dilke, and Thomas Fairbairn to carry into effect such undertaking, and to grant to them Our Charter of Incorporation: And whereas it hath been further represented to Us that with a view to the arrangements for the said Exhibition, it will be necessary for the Corporation to be hereby created forthwith to borrow sums not exceeding in the whole £250,000, and that the Governor and Company of the Bank of England or other persons will be willing to advance that sum on having the repayment thereof secured by the covenant of the Corporation, to be hereby created, and by the covenant of a sufficient number of other persons: And whereas it hath been further represented to Us, that with a view of forwarding the undertaking many of Our loving subjects are willing to enter into proper covenants to effect such purpose, the covenants to be so framed as in the event of any payment being made thereunder as far as practicable to subject the covenantors to bear such payment rateably according to the amounts by them subscribed, but not exceeding in each case the amount of the subscription: And it hath also been represented to Us that it is essential to the well conducting of the affairs connected with the undertaking, and with the view of preventing disputes and litigation hereafter in reference thereto, that the general nature of the undertaking as sanctioned and approved by Us, and of the duties, rights, and powers of the persons conducting the same, shall, so far as conveniently may be, be defined, and shall be notified to all whom it may concern, by means of such Charter: And whereas it is further represented to Us, that under arrangements made between the said Society and the Commissioners for the Exhibition of 1851, incorported by Our Royal Charter bearing date the 15th day of August, in the 14th year of Our reign, and continued and endowed with further powers by Our Royal Charter, bearing date the 2nd day of December, in the 15th year of Our reign, those Commissioners have agreed to grant, rent free, the use of a certain site for the said Exhibition of 1862, subject to certain regulations relating to the approval by them of the buildings to be erected thereon, and with a provision that, in case the persons having the conduct of that Exhibition should, before the 31st day of December, 1862, give notice of the desire of the said Society to retain

certain permanent buildings intended to be erected for the Exhibition of 1862, the Commissioners for the Exhibition of 1851 would grant to the said Society a lease of the site to an extent not exceeding one acre, whereon those permanent buildings should be erected, with a view, amongst other things, to assist the holding of future Exhibitions; and in case the same persons shall, out of the profits of the undertaking, pay to the same Commissioners a sum of £10,000, those Commissioners have agreed to reserve (subject to certain conditions) a certain site for an Exhibition to be held in the year 1872. Now know ye, that We, being earnestly desirous to promote the holding of an International Exhibition of Industry and Art in the year 1862, do, by these presents, for Us, Our heirs and successors, give, grant, and ordain that the said Earl Granville, the Marquis of Chandos, Thomas Baring, Charles Wentworth Dilke, and Thomas Fairbairn, and the survivors and survivor of them, and such other persons, if any, as shall be appointed, in manner hereinafter provided, to be Commissioners, in lieu of them or any of them, shall be one body politic and corporate, by the name of "The Commissioners for the Exhibition of 1862," and by that name shall and may sue and be sued, implead and be impleaded, and shall have perpetual succession and a common seal, with full power to alter, vary, break, or renew the same at their discretion: And We will and ordain that the Corporation hereby incorporated, hereinafter referred to as "Our Commissioners," is incorporated for the purpose of conducting and managing an International Exhibition of the Products of Industry and Art of all Nations, such Exhibition to be held in or near the metropolis in the year 1862, or within such further time as is hereinafter provided in that behalf; and We will and ordain that Our Commissioners shall have the entire conduct, control, and management of the said Exhibition, and of the funds that may arise from that undertaking, and that such Exhibition may be carried on either in accordance with the precedent afforded by the Exhibition of 1851, or in such other mode or manner as Our Commissioners shall in their discretion think fit, but subject to such special directions as are hereinafter contained. And We will and ordain that Our Commissioners shall have power to borrow and take up at interest, for the purposes of the said undertaking, such sum or sums of money as they may think fit, and may from time to time, for such purpose, mortgage or pledge the funds or other property of the said Corporation, and may, under their common seal, execute any deed or deeds of covenant or other deed or deeds for securing repayment of any sum or sums so to be borrowed, with interest, and may also procure any persons willing to guarantee the repayment of any such sum or sums or any part thereof, to execute a deed of covenant for payment of such sums as the covenantors may be willing to become liable for, so as to guarantee the due repayment of any sum or sums which may be so borrowed with interest, and all costs, charges, and expenses caused by the non-payment thereof, and that the said deed or deeds of covenant shall contain all necessary and proper provisions, and in particular provisions to insure, as far as practicable, that none of the covenantors shall ultimately bear more than his fair and proper proportion of the sums which they may respectively covenant to pay, and the several persons who shall make and enter into such covenants are hereinafter referred to as the guarantors, and the sum or sums of money which shall be so borrowed and secured to be paid are hereinafter referred to as "The Guaranteed Debt of the Corporation." And We will and ordain that each of the several persons hereby incorporated and any person who may as hereinafter provided be appointed in the place of any of them, may execute the said deed of guarantee in his own individual capacity for such sum as he may think fit. And We do hereby direct and authorize our Commissioners to make and enter into such arrangements as they and the Commissioners for the Exhibition of 1851 may mutually agree upon, for holding the Exhibition on a portion of the estate of those Commissioners at Kensington Gore, in accordance with the arrangements already made with them by the Society of Arts, or which may hereafter be made by Our Commissioners with the Commissioners for the Exhibition of 1851, so as such other or further arrangements shall not, without the approval of the Society, be inconsistent with the arrangements already made between the Society and those Commissioners; or they may choose and contract for the occupation of any other site for holding the intended exhibition, provided such site be situate within ten miles from St. Paul's Cathedral, in the City of London, measured in a direct line. And We will and direct that in case the Exhibition shall be held on any part of the lands of the Commissioners for the Exhibition of 1851, then that Our Commissioners shall cause a sum not exceeding £50,000, to be expended on buildings of a permanent character, and such as may be adapted for the purposes for which the Society of Arts may require to have a lease of the site of such buildings, under the arrangements now made or contemplated between them and the Commissioners for the Exhibition of 1851, and which buildings are hereinafter referred to as "The Permanent Buildings." And We will and ordain that our Commissioners may contract for, erect, and, subject to such special direc-

tions as are herein contained, may remove, or may leave standing at the close of such Exhibition, any building or buildings erected for the same in accordance with such arrangements as have been or shall be lawfully made in that behalf; and may, if they think fit, distribute prizes to exhibitors and may do all matters and things connected with such distribution; and shall have full power to receive and take such sums of money as they may direct, for entrance to the Exhibition, or for the rent of any part of the buildings to be erected or otherwise relating to the premises, and to dispose of all moneys which shall come to their hands as they shall think fit, for and towards the purposes of the said Exhibition or otherwise, in the execution of the powers hereby given to them, including the payment of all expenses, charges, and liabilities which they may incur or become subject to; and that they shall have full power to give effectual discharges to any persons paying any moneys to them, and to settle and adjust any accounts relating thereto; and generally to do all matters and things that may be necessary, or may appear to them to be expedient, for promoting the ends and designs of the said Exhibition. And We do hereby ordain, that it shall be lawful for Our Commissioners, and they shall have full power and authority, from time to time to depute or choose any persons, and to give to them all or any of the powers and authorities hereby given to Our Commissioners as they shall think fit, for managing and conducting all or any of the matters and things hereby authorised to be done by Our Commissioners, and which may be necessary for conducting or in any manner relate to or concern the said Exhibition. And We do hereby ordain that it shall be lawful for Our Commissioners from time to time to appoint one or more secretaries and such other officers as they may think fit, and to remove all persons appointed by them and to appoint others or not as they see fit. And we do hereby ordain that our Commissioners may elect one member of their corporation to be the chairman thereof, and from time to time may vary such chairman as they think fit; and also that our Commissioners may elect such other person or persons as they may think fit to be Commissioners in lieu of any one or more of them who may die or desire to be discharged from or become incapable to act in the execution of the office of Commissioner before the duties of such office shall be fully performed. And we will and ordain that such appointment of a Commissioner or Commissioners shall be made by a resolution to be passed at a meeting specially to be called for that purpose, but no appointment shall be effectual and valid unless and until the person or persons appointed shall be approved by us, such approval to be testified by a minute in writing, to be signed by one of our principal Secretaries of State, and published in the *London Gazette*. And we order and direct that Our Commissioners shall meet when and at such place or places as, from time to time, they shall direct or determine, and that all and every the powers hereby given to Our Commissioners may be exercised at any meeting of any two or more of the Commissioners and that the decision of the majority attending at any meeting shall be binding, and determine any question proposed; and that when the votes shall be equal the chairman of the corporation for the time being, if present, shall, in addition to his vote as a member, have the casting vote, and that Our Commissioners shall and may, from time to time, make and repeal or alter such rules, orders, regulations, and bye-laws for the management of the business of the undertaking as they may think fit, so as the same be not contrary to the laws of this our realm, and such rules, orders, regulations, and bye-laws shall, when made, and till the same shall be repealed or altered, be as effectual as if they were contained in this our Royal Charter: Provided always; and We will and ordain that in case it shall appear to Our Commissioners, from any cause not now foreseen, expedient to postpone the holding of such Exhibition until some time in the year 1863, it shall be lawful for them, with the consent in writing of any one of our principal Secretaries of State, to do so, by inserting in the *London Gazette*, on or before the 1st day of March, 1862, notice that the said Exhibition is to be so postponed, and in that case they shall and may hold such Exhibition accordingly, in the year 1863; and in case after making any contracts or engagements for the holding of such Exhibition, they shall from like cause see fit to abandon it altogether, they may, with the like consent, so do, giving like notice thereof, upon and subject to their making compensation to persons with whom they may have entered into any contracts in relation to the holding thereof, or incident thereto, which in such case we require and authorise them to make. And We do will and ordain that, so soon as conveniently may be after the closing or abandonment of the Exhibition, Our Commissioners shall sell, dispose of, and convert into money, all property and effects belonging to them which can be so sold and converted, particularly all the buildings erected by them for the purposes of the undertaking, save and except "The Permanent Buildings." And We will and ordain, that immediately after such sale and conversion into money, Our Commissioners shall, out of the monies to arise by such sale and conversion, or of which they shall be otherwise possessed, proceed, after payment of all costs, charges, and expenses incident to the undertaking, to pay and discharge, so far as such monies will extend, in such order and priority as the law may require or Our Commissioners see fit, all their debts and

liabilities, save and except the guaranteed debt of the Corporation; and after payment of all such debts and liabilities, except as aforesaid, and providing and setting apart a reasonable sum for the payment of future expenses incident to the completion of their duties, Our Commissioners shall apply the surplus of such monies, if any, in or towards the payment and satisfaction of the guaranteed debt of the corporation, or in case the guarantors, or any of them, shall have been called upon to pay, and have paid, any monies in respect of the guaranteed debt of the Corporation, then in repaying to them, so far as the monies applicable for such purposes will extend, the amount which the guarantors shall have so paid, in such manner, as far as practicable, as to secure that none of the guarantors shall pay more than his just and fair proportion of the sum which he shall have bound himself to contribute. And We will and ordain that as soon as may be after such sale and conversion as aforesaid, Our Commissioners shall cause a statement of the accounts relating to the undertaking to be made up, and shall submit for examination the vouchers for the receipt and expenditure to the Governor of the Bank of England, the Deputy-Governor of the Bank of England, and the Comptroller-General of the National Debt, or such person or persons as such Governor, Deputy-Governor, and Comptroller-General, or any two of them, shall appoint to make such examination, and shall submit a duplicate of such statement to the Society of Arts for their information; and Our Commissioners shall then proceed to ascertain whether or not (having reference, if necessary, to the value of the permanent buildings, and calculating such value according to the amount such buildings are likely to realise if taken down and the materials sold,) there has been a gain or loss attendant upon the undertaking, and shall forthwith certify, under their common seal, whether there shall have been a gain or loss, and, as near as may be, the estimated amount of such gain or loss, having reference to the value of the permanent buildings, and shall cause their certificate to be forthwith published in the *London Gazette*. And in case, irrespective of the value of the permanent buildings, there shall have been a loss attending the said undertaking, then if the Society of Arts shall, with a view to obtain a lease of the permanent buildings in accordance with such arrangement as hereinbefore in that behalf mentioned, be willing out of their corporate funds to bear and sustain that loss, it shall be incumbent upon Our Commissioners, if so required by the Society of Arts, by notice in writing under the hand of their Secretary, to be delivered within one calendar month from the publication of such certificate, to make and enter into such arrangement with the Society as may secure to them the benefits of such lease, subject to the Society bearing such loss and undertaking to provide sufficient funds to enable Our Commissioners to pay and satisfy all the remaining debts and liabilities of the said Corporation, including the guaranteed debt of the Corporation, or so much thereof as shall remain unpaid, and the Society undertaking to indemnify the guarantors from all loss and liability in respect thereof, but in default of the said Society serving such notice in due time, or of their duly and effectually performing all acts to carry out such arrangement as provided for by the clause last hereinbefore contained, then our Commissioners shall forthwith or so soon as conveniently may be, sell the permanent buildings, and out of the proceeds thereof, after payment of all cost incident to such sale, or otherwise incident to the undertaking and remaining unpaid shall discharge all debts and liabilities if any attending the undertaking remaining unpaid, except the guaranteed debt of the Corporation, and shall apply the surplus if any in or towards satisfaction of the guaranteed debt of the Corporation, or in case the guarantors, or any of them, shall have been called upon to pay and have paid, any monies in respect of the guaranteed debt of the Corporation, then in repaying to them, so far as the monies applicable for such purposes will extend, the amount which the guarantors shall have so paid, in such manner, as far as practicable, as to secure that none of the guarantors shall pay more than his just and fair proportion of the sum which he shall have bound himself to contribute; and if any surplus shall remain after all such payments, then such surplus shall be disposed of in manner hereinafter directed as to and concerning the ultimate disposable profit of the undertaking in case of there being a gain attending the undertaking. And We will and ordain that in case, after payment of all the debts and liabilities attending the undertaking, it shall be found that, irrespective of the permanent buildings, there shall have been a gain attending the undertaking, then the permanent buildings shall be left standing for the Society of Arts, in accordance with the aforesaid arrangements, and out of such gain, Our Commissioners shall firstly pay to the Commissioners for the Exhibition of 1851, if desired by the Society of Arts, as hereinbefore recited, a sum not exceeding £10,000 as a consideration for their reserving a site containing 16 acres or thereabouts for an Exhibition of the Products of Industry and Art to be held in the year 1872, on the lands belonging to such Commissioners, and shall, secondly, apply in completing the permanent buildings in an architectural manner, and in a manner suitable for the objects for which they are to be employed by the Society of Arts, so much of the unexpended portion of the sum hereinbefore mentioned to be intended to be expended on the permanent buildings, not

exceeding £50,000 as in the judgment of our Commissioners jointly with that of the Commissioners for the Exhibition of 1851 may be requisite for that purpose. And we will and ordain that if there shall remain any surplus of such gain arising from the said undertaking after all the payments hereinbefore provided for such gain shall be considered as the ultimate disposable profit of the undertaking and shall be disposed of as hereinafter in that behalf provided; viz. :—We will and ordain that Our Commissioners shall apply the ultimate disposable profit of the undertaking for such purposes connected with the Encouragement of Arts, Manufactures, and Commerce, as shall be determined by the guarantors at a meeting to be called for the pupose at such time and place, and in such manner by advertisement or otherwise as Our Commissioners shall think fit, and whereof 28 days' notice at the least shall be given at which meeting the question to be determined shall be decided and settled by the votes of guarantors representing the majority in value of the subscriptions of the persons actually present and voting : Provided further that before proceeding to ascertain the amount of each subscription, for the purpose of such decision, it shall be lawful for the Chairman of the meeting to take a show of hands on any question to be submitted to the meeting, and his decision if not objected to as to such show of hands shall be considered conclusive and binding without the actual necessity of ascertaining the exact amount for whieh each Guarantor shall have signed the agreement. And we will and ordain that the services of our said Commissioners shall be rendered gratuitously : but we direct that Our Commissioners may, out of the corporate funds, allow and pay to their Secretaries and Officers, and other persons who may aid them in the conduct of such Exhibition, such salaries and gratuities or other remuneration as they may think fit ; and they may thereout also pay the costs, charges, and expenses incurred, or to be incurred, by the Society of Arts, in promoting the said undertaking, and in getting the requisite instruments made and executed by the guarantors : Provided always, that when and as soon as any sum or sums of money which may have been borrowed by Our said Commissioners under the powers aforesaid, and all interest thereon shall be fully paid, and all other the matters and things entrusted to be done by this Our Charter by the said Commissioners hereby incorporated shall be fully performed, or become incapable of being executed, and when the same shall have been certified under the Corporate Seal to one of our principal Secretaries of State then these presents, and every matter and thing herein contained, shall be absolutely void.

In witness whereof We have caused these our Letters to be made Patent. Witness Ourself at Our Palace at Westminster, this Fourteenth day of February, in the Twenty-fourth year of Our reign.

By Her Majesty's Command,

EDMUNDS.

The following letter has been received by Sir Thomas Phillips, Chairman of the Council of the Society of Arts :—

Council Office, Feb. 20, 1861.

Sir,—I am directed to acknowledge the receipt of Mr. Foster's letter of the 16th of February, enclosing the Charter which has been granted to Earl Granville, K.G., the Marquis of Chandos, Mr. Thomas Baring, M.P., Mr. C. Wentworth Dilke, and Mr. Thomas Fairbairn, incorporating them as The Commissioners for the Exhibition of 1862.

The Commissioners, on the 22nd of November last, agreed to act, after a guarantee had been promised, to such an extent as to show a strong opinion in the public mind that the time for holding a second International Exhibition had arrived; after the guarantors had expressed an opinion that the absolute control of the undertaking ought to be entrusted to five gentlemen, named by them; and after the Commissioners of the Exhibition of 1851 had intimated their approval of the project, and their confidence in the proposed mode of management, and had promised their support and assistance ; The Commissioners, therefore gladly accept a Charter which conveys to them her Majesty's gracious assurance that she is earnestly desirous to promote the holding of an International Exhibition of Industry and Art in the year 1862, and that she is pleased to sanction the proposed arrangements.

The powers conveyed by the Charter will, however, be practically inoperative until the Deed of Guarantee has been executed. When this has been done the Bank of England has agreed to advance the necessary loan of money on liberal terms. The Commissioners therefore desire me to request that you will represent to the Council the necessity of having the deed signed as soon as possible.

The Commissioners, unwilling to lose valuable time, have, during the interval required for the preparation of the requisite legal powers, taken such provisional steps as their position permitted.

The most pressing point was the building required for the Exhibition. In 1850, notwithstanding the possession of considerable funds, and the assistance of the most eminent architects and engineers, seven months elapsed before a design was adopted. The Commissioners therefore felt that if they postponed the consideration of this subject until they were a legally constituted body, the cost of the

building would be greatly increased, and a serious risk incurred of its non-completion by the appointed time.

The arrangements made by the Society of Arts, when negociating for a site on the estate of the Commissioners of 1851, and their announcement that the Exhibition was to include pictures, a branch of art not exhibited on the former occasion, rendered it necessary to contemplate the erection of a building in some parts of a more substantial character than that of 1851.

A plan was submitted to the Commissioners by Captain Fowke, R.E., who had been employed by her Majesty's Government, in the British Department of the Paris Exhibition of 1855. This design was adapted to the proposed site, and was intended to meet the practical defects which experience had shown to exist both in the buildings in Hyde-park and in the Champs Elysées. It appeared well adapted for the required purposes, and its principal features were of a striking character, and likely to form an attractive part of the Exhibition. The Commissioners submitted the design to the competition of ten eminent contractors, four of whom took out the quantities. Three tenders (one a joint one from two of the contractors invited) were sent in on the day named in the invitation, but all were greatly in excess of the amount which the Commissioners could prudently spend, with a due regard to the interests of the guarantors.

The Commissioners have, therefore, had under their consideration, modifications of the plan, which, without destroying its merits, would materially reduce its cost.

The Commissioners having learnt that the French Government had applied, on the 3rd of November last, to the Foreign Office, to know whether it was intended to hold an International Exhibition in England in 1862, entered into private communication with that Government, from whom they have received satisfactory assurances of support, accompanied by a statement that it had been the intention of the Emperor to hold an International Exhibition in Paris in 1862, had the project not been entertained in England.

The Commissioners also requested the Duke of Newcastle, the Secretary of State for the Colonies, to announce the design entertained of holding an Exhibition, and the intention of the promoters to apply to the Crown for a Charter; and the Commissioners have been informed that his Grace has addressed a communication to that effect to all the Governors of Her Majesty's Colonies.

The Commissioners have had under their consideration the revision of the rules laid down in 1851, respecting the award of Prizes, the Constitution of Juries, the affixing of Prices, the Distribution of Space, the mode of Classification, and also the Organization of the additional Department of the Fine Arts.

When, therefore, the Guarantee Deed has been executed, the Commissioners hope to be able to proceed at once with the construction of the buildings, and to announce the rules and regulations for the arrangement of the Exhibition.

I have the honour to be, Sir,
Your obedient servant,
F. R. SANDFORD.

CENTRAL COMMITTEE OF EDUCATIONAL UNIONS.

A meeting, of which the objects are explained below, was held at the Society's House on Friday, the 8th inst. The following circular has been issued to the various Provincial Unions:—

CENTRAL COMMITTEE OF EDUCATIONAL UNIONS.

(IN CONNEXION WITH THE SOCIETY OF ARTS.)

House of Society of Arts, John-street, Adelphi, London, W.C., 22nd February, 1861.

Sir,—The meeting summoned to take into consideration the "Proposals" which were communicated to you by the Honorary Secretaries of the "Southern Counties Adult Education Society," was held here on Friday, the 8th instant.

The Chair was taken by Sir Thomas Phillips, Chairman of the Council of the Society of Arts.

There were also present—

The Rev. Thomas Bacon, Honorary Secretary of the Southern Counties Adult Education Society.

The Hon. and Rev. S. Best, Honorary Secretary of the Southern Counties Adult Education Society.

Barnett Blake, Esq., Agent of the Yorkshire Union of Mechanics' Institutes.

Harry Chester, Esq., Vice-President of the Society of Arts.

The Rev. Samuel Clark, Chairman of the Central Board of Examiners of the Society of Arts.

The Rev. C. D. Goldie, Member of Committee of the Bucks and Berks Adult Education Society.

The Rev. David Melville, Member of Council of the Worcestershire Union of Educational Institutions.

John Slany Pakington, Esq., President of the Worcestershire Union of Educational Institutions.

Samuel Redgrave, Esq., Treasurer of Society of Arts.

Wm. Spottiswoode, Esq., F.R.S., Member of Council of Society of Arts.

F. Talbot, Esq., Secretary of the South Staffordshire Union of Educational Institutions.

The Rev. T. H. Tooke, Southern Counties Adult Education Society.

The following resolutions were passed unanimously:—

1. "That to promote uniformity of action and a fixed standard of Examinations in Provincial and District Adult Education Societies in connection with the Society of Arts, a Central Committee be established, to consist of two representatives of each of such Societies, four members of the Council of the Society of Arts, and the Chairman of the Society's Central Board of Examiners."

2. "That the Society of Arts be requested to provide for the correspondence of the Committee."

3. "That the gentlemen present form a Provisional Committee for carrying out the objects in view."

The Provisional Committee earnestly hope that your Union will co-operate with them, and send representatives to the Central Committee.

It is not proposed to interfere in any way with the government of the Unions, nor to supersede anything already accomplished by the Society of Arts, by the District Unions, or by the Local Boards and Institutions. On the contrary, it is a principal aim of the central committee to promote the better accomplishment of the objects of all those bodies.

The importance of the systematic instruction and examination of adults is now generally acknowledged; but, while much has been done for those objects, a great deal more is required before the necessary machinery for attaining them will be complete.

The Local Examinations of the Universities have had an excellent effect upon the education of the higher and middle classes, but are not intended for the lower classes, nor open to persons above 18, to women, or to young children. The inspection of the Committee of Council on Education has been of the greatest service to the elementary education of the working classes, but takes effect only upon children at school, *i.e.*, children under 10 or 12 years of age.

The "Previous" and "Final" examinations of the Society of Arts are especially designed for the industrial classes in general, and may be taken advantage of in any part of the United Kingdom. They were held last year, with great success, before 63 different Local Boards in England, Scotland, Ireland, and Wales, and will probably be held this year in many additional places. They are limited, however, to persons of 16 years of age and upwards; and, in order to reach effectually those classes of the industrial population who are at present disqualified by the want of the prescribed age and attainments, and to lead them on to these examinations, some further provision has from the first been seen to be necessary.

The great point is that there should be everywhere provided for children, when they leave their day schools, not only the means of continuing their instruction in evening schools, or otherwise, but also those inducements to perseverance which are to be found in examinations, certificates, and prizes. Such a provision has already been made to a considerable extent by the District Unions of Institutions, Adult Educational Societies, and Local Boards of Examination connected with the Society of Arts; and the Society has constantly recommended to the Institutions that they should group themselves into District Unions, and to the Unions and Local Boards that they should conduct Local Elementary Examinations, and grant certificates and prizes, on their own authority, in order to supply this want.

The Provisional Committee is very far from disparaging the excellent results which the District Unions and Local Boards have accomplished in this direction; but there is such a want of uniformity in their proceedings, and the subjects and standards of their elementary examinations vary so greatly, that their Certificates have no settled value. The work is generally fragmentary, instead of uniform, and the trouble and expense of preparing and printing the examination papers and other documents are unnecessarily heavy.

It is now intended to have a permanent "Central Committee of Educational Unions in connexion with the Society of Arts;" and it is hoped that, by periodical meetings of the representatives of the various Unions, the experience of each Union will become available to all the others; that a uniform system of elementary examinations (with only such variations as may be requisite to suit different localities) and corresponding certificates may be established, throughout the United Kingdom, for those who have ceased to be admissible to the examinations of the Inspectors of Schools, and have not as yet become admissible to the examinations of the Society of Arts, and that the certificates granted by any Educational Union, represented in the Central Committee, may have everywhere a known value and currency, being issued not on the authority of a mere isolated local body, but on the authority of a local body having a well understood place in a general and truly national system, which embraces the Society of Arts' Union of Institutions and Local Boards, and all the Provincial and District Educational Unions and Adult Educational Societies which may be represented in the Central Committee.

If that Committee prepares, prints, and distributes, at cost price, as is proposed, such examination papers, certificates, and circulars, as may be used in common by all the Unions, there will be a great saving of trouble and expense.

The Society of Arts has undertaken to provide for the correspondence of the Central Committee, at least for the present, and until it becomes too onerous; and its proceedings may be reported in the Society's Weekly *Journal*, which is sent gratis to all the Institutions in union with the Society.

To avoid the unnecessary re-examination of candidates, it is proposed that such of the certificates of the District Unions and Societies represented in the Central Committee as may be equivalent to the "passes" required for admission to the Society's Final Examinations shall be accepted by them as "passes" without a further "Previous Examination."

This is but an outline of what is proposed. Definite regulations in detail will be adopted when the Unions have had time to decide upon sending their representatives to the committee. It will not be necessary to send always the same representatives. The meetings will be held, as far as possible, in the spring, when gentlemen connected with distant localities are likely to be in London.

You will observe that the District Unions which are to be represented in the Central Committee are to be in connexion with the Society of Arts. This is requisite to bind the whole together for mutual advantages; but, as you are aware, the connexion with the Society in no degree compromises the independence of the Unions and Institutions; and any District Union may comprise in its own circle any number of Institutions and evening schools that have no other but that indirect connexion with the Society.

The first meeting of the Central Committee will be held here on Friday, the 22nd of March, at 2 o'clock precisely. It is proposed that the second meeting should be held on the day before the Annual Conference of the Society of Arts, when repsesentatives from most of the Unions are likely to be in London.

In the meanwhile the Provisional Committee hope to hear from you at your earliest convenience. They will be glad to give any further information in their power, and to learn the views of your Committee upon these proposals, and they hope to be soon informed that it will cooperate with the Central Committee.

I am, &c.,
P. LE NEVE FOSTER, Secretary.

ELEVENTH ORDINARY MEETING.

Wednesday, February 20, 1861.

The Eleventh Ordinary Meeting of the One Hundred and Seventh Session, was held on Wednesday, the 20th inst., William Hawes, Esq., Member of Council, in the chair.

The following gentlemen were proposed for election as members of the Society:—

Durham, the Earl of,...	35, Grosvenor-square, W., and Coupland Castle, Wooler.
James, Jabez Stanley, / Powis, Charles, ...	26, Watling-street, E.C.
Wood, Thomas, Ph.D.	123, Upper Thames-street, E.C.

The following candidates were balloted for and duly elected members of the Society:—

Dixon, Thomas	Millgarth Mill, Dyer-street, Leeds.
Hughes, Richard Hugh	96, Hatton-garden, E.C.
Leach, George	Britannia Mills, Leeds.
Martin, John	Killyleagh Mills, Co. Down, and 29, Ann-street, Belfast.
Rein, Frederick Charles	108, Strand, W.C.
Reynolds, Wm. G. ...	20, Stratford-place, Camden-square, N.W.

The Paper read was—

THE ALPACA; ITS INTRODUCTION INTO AUSTRALIA AND THE PROBABILITIES OF ITS ACCLIMATISATION THERE.

By George Ledger.

I propose this evening to treat my subject more in a popular and commercial than in a scientific manner, taking more the experiences of practice than the theories founded upon scientific observations, although no one feels more than I do the obligations we owe to them. Having the advantage of constant communications with my brother, Mr. Charles Ledger, who has recently introduced the alpaca into Australia, I will endeavour to place before you the results of his devotion of a great portion of 22 years of his life to the study of the peculiar habits of this valuable animal, and to the accomplishment of his enterprise.

It may be asked, Why this interest here in England upon the acclimatisation of a new animal upon lands situate at our antipodes? The answer is, the first physical necessity of mankind is food, the second clothing. Of the principal substances used in the manufacture of clothing—wool, cotton, flax, and silk—wool is second in importance. The acclimatisation of the alpaca simply means the growth of more wool.

There are two great experiments in connexion with our national prosperity, which will probably take the lead of all others during the next quarter of a century, viz., the growth of cotton either in India, Africa, Australia, or South America, and the increased production of wool.

The alpaca, the llama, the vicuna, and the guanaco, were unknown to Europeans prior to 1525, when Pizarro, with his followers, first set foot on Peruvian soil; the two former were domesticated, while the two latter, in a wild state, ranged the mountainous tracts of the newly-discovered land. To the new comers, these animals, particularly the llama and the alpaca, appeared to partake of the properties of the camel and the sheep.

I notice the guanaco first, because it is the largest of these animals, but, as it is scarcely to be called a wool-producing animal, the supply being insignificant, and little or none of it being exported, I shall very shortly dismiss it from consideration.

The region between the Andes, or Eastern Chain, and the Cordilleras, or Western Chain, comprises a vast plateau, or rather many table lands, about 12,000 feet above the level of the sea, which is called by the natives "Puna." The surface is principally covered with a short fine grass, and there are many hilly pastures; and here are found the llama and the alpaca, the guanaco, and the vicuna, but they are not confined to this region. In summer the flocks of llamas and alpacas are driven to an elevation of 15,000 to 16,000 feet, and in winter to an elevation of 12,000 to 14,000 feet.

The guanaco ranges over a greater extent of country than either of the other species, being found on the immense tracts of table land as far south as "Terra del Fuego," and north to the slopes of the towering Chimborazo; in appearance it very much resembles the llama, although nearly half as large again—the wool is much shorter, coarser, and intersected with hair, and worked up by the Patagonians and Aurocano Indians into blankets, ponchos, &c., while its skin is used as a quilt. The meat is the best of the class, and is highly esteemed. It is very seldom domesticated.

The vicuna, like the chamois, inhabits the highest tracts of land; it is the smallest but most graceful animal of either of the species; its flesh is principally used very slightly salted, dried in the sun, frost, and wind, under the name of *charque*, although it is not so much esteemed as the flesh of the guanaco or the llama. Its wool is finer and more valued even than that of the alpaca, but its yield is very small, seldom, if ever, exceeding a pound a year. My brother informs me he has succeeded in producing a cross between the alpaca and the vicuna, which is termed the paco-vicuna, and that its wool partakes of the peculiar softness and superior fineness of the vicuna, and the greater length of staple of the alpaca. I have also heard from gentlemen who have spent many years in Peru, Chili, &c., that the curate of San Antonio, a small town about 40 leagues from Puno, has also succeeded in producing a similar cross, even to the 2nd and 3rd generations, which produce a splendid wool; this reverend gentleman, has, I am given to understand, received from the Peruvian Assembly a vote of thanks, and his portrait decorates the walls of the museum of Lima, amongst the the Viceroys of Peru, with an inscription declaring him to have deserved well of his country; and I believe he enjoys a pension of £120 from the Peruvian Government.

Although the quality of the vicuna wool stands so high in the estimation of manufacturers, the quantity is so small that I have not been able to obtain any record of the amount brought within the circle of commercial operations, a large quantity being consumed in the country in the manufacture of ponchos, sombréros, &c. The skins are brought to this country with the wool upon them.

The llama, the larger and least valued of the domesticated animals, about the size of the red-deer, partakes somewhat of the nature of the Arabian camel. Like the camel, it is used as a beast of burden; like the camel, it can live many days without water, but it is more useful than the camel, inasmuch as its flesh is used for food, and, when young, is savoury and nutritious; and its wool for clothing, and other useful purposes—to a much greater extent than that of its Arabian compeer.

From the earliest period to which even Peruvian records extend, it appears the llama has been used as a beast of burden; its load is generally from 60lb. to 100lb. and 150lb., and its rate of travelling about three to five leagues a day; it is driven in flocks of sometimes as many as 500 to 1,000, and requires little trouble from the drivers, one of the oldest and most experienced leading the way, and the others following.

The organisation both of the llama and the alpaca is admirably suited to the nature of the country they inhabit. The eye, from its size and shape, indicates the possession of a strong and quick sight, and also enables them to bear the reverberation of the rays of the sun from the sand and snow; the sole of the foot is guarded by a cushion, and the toes armed with hard and curved nails, which enable them to climb with ease steep and craggy places; the construction of the mouth and teeth enables them to cut short grass upon the ground, while, joined to the length of neck, and with the aid of the tongue and cleft lip, they can reach and cull herbage growing in interstices of rocks as well as the tender shoots of tall shrubs. The division of the stomach into compartments enables them to retain both food and water, and to use the latter for the assistance of the process of mastication or to allay thirst.

The number of these animals employed in Peru and Bolivia in the carriage of barrilla, grain, wool, bark, ores, and other products from the interior to the coast my brother estimates at over 600,000, and for the interior communication between town and town, mines and amalgamating establishments with ore and fuel, at double that number, giving a total of 1,800,000 so employed.

The llama wool is principally consumed in the country—very little being exported; it is used for sacking in the transport of grain, flour, &c. About 2,000,000 lb. are annually consumed in this way. The "soga," or cord, by which the load is secured to the back of the animal will consume annually another 2,000,000 lb. Many and varied are the articles manufactured from the llama wool —cordage, carpets, bed coverlets, bags and sacks for various purposes, taking, perhaps, 2,500,000lb. The alpaca wool, of greater value and more certain in its demand, so that the llama wool is more used in the country. Those used as beasts of burthen are never shorn, their wool serving the purposes of a pack.

The meat of the llama is highly nutritious; the Indians kill off the old ones of their flocks from time to time during the year.

The Alpaca.

The alpaca stands about 4 feet in height and is of inferior size to the llama, the size of a full grown deer, producing a much finer and longer fleece.

The Indians hold for this animal a superstitious reverence, and most firmly believe, that any sufferings the animals may undergo on being driven off their pasture grounds, will be visited on them and theirs.

In the 16th century, and even from the remotest times, the Peruvians, being comparatively (to the other tribes of the great continent of America) a civilised people, and well acquainted with the arts of spinning and weaving, fabricated from alpaca wool, textures of much delicacy and beauty, which were highly prized as articles of dress. And that the use of them had prevailed for centuries is proved by the opening of very many of the "Huacas" or ancient tombs of the Peruvians, in which the dead had been enwrapped in stuffs made from the fleece of the alpaca. The wool having risen in value and become an article of so much demand, little or none is at present manufactured in the country, or has been for the last 25 or 30 years. Its fleece is superior to that of the sheep in length and softness, averaging 7 to 9 inches, and sometimes it is procured of an extraordinary length. The fleeces when annually shorn, range from 7 to 10, 11 and 12 lbs. Contrary to experience in other descriptions of wool, the fibre of the Alpaca's fleece acquires strength without coarseness, besides each filament appears straight, well formed, and free from crispness, and the quality is more uniform throughout the fleece. There is also a transparency, a glittering brightness enhanced on its passing through the dye vat. It is also distinguished by softness and elasticity, essential properties in the manufacture of fine goods, being exempt from spiral, curly, and shaggy defects; and it spins easily when treated properly according to the present improved method, and yields an even, strong and true thread.

Notwithstanding the remarkable quality and beauty of the alpaca wool, it was long before its value was appreciated in Europe. According to the best authorities, the first person in England who produced a marketable fabric made from this material, was Mr. Benjamin Outram, a scientific manufacturer, of Greetland, near Halifax, who, about the year 1830, surmounted with much difficulty the obstacles encountered in spinning the wool, and eventually produced an article which sold at high prices for ladies' carriage shawls, and cloakings; but their value arose more from being rare and curious articles than from intrinsic worth. These were, it is well established, quite destitute of the peculiar gloss and beauty which distinguish the alpaca lustres and fabrics of later times, and after a short period the manufacture was abandoned.

To Mr. Titus Salt, of Bradford, must, undoubtedly, be awarded the high praise of finally overcoming the difficulties of preparing and spinning alpaca wool, so as to produce an even and true thread, and by combining it with cotton warps, which had then (1836) been imported into the trade of Bradford, improving the manufacture, so as to make it one of the staple industries of the kingdom; he has, by an admirable adaptation of machinery, been enabled to work up the material with the ease of ordinary wool.

And now, not only are alpaca goods produced in every conceivable variety and style, but at all prices, to suit the means of all classes of the community. Blended with silk thread, they have the appearance of fine lustrous satin; with figures and patterns thrown upon them in silk of different hues, they serve as admirable substitutes for figured silks, both for ladies' dresses and for waistcoatings, whilst with cotton woven amongst its fibres, the article may be sold at such a moderate price as to bring it within the reach of the most humble.

Gentlemen are provided by means of this fabric with waistcoating as cool as any cotton, yet rich and lustrous as any silk. Dwellers in tropical climates are thankful to possess a black coat which, while it has the appearance of broad-cloth, is not a fourth of its weight.

Most of the alpaca wool taken into the United Kingdom, is unshipped at Liverpool, but a small portion is also carried to London. At these two ports, it may be asserted, the whole imported is landed. It arrives in small bales, weighing 60, 100, 150 lbs. The 1st put up for llama carriage; the 2nd for donkey carriage; the 3rd for mule carriage.

Dating from the year 1834, when the importation of alpaca wool sprung up as a permanent branch of commerce, the demand has been a growing one, the quantity imported being, in—

	lbs.		lbs.
1834	5,700	1839	1,325,500
1835	184,400	1840	1,650,000
1836	199,000	1841	1,500,000
1837	385,800	1842	1,443,299
1838	459,300		

Since the year 1843, the returns of alpaca wool imported into Great Britain, are of a more reliable character. The following table has been drawn up from "data" furnished by the Board of Trade.

	lbs.		lbs.
1843	1,458,032	1852	2,068,594
1844	635,357	1853	2,148,267
1845	1,261,905	1854	1,267,513
1846	1,554,287	1855	1,446,707
1847	1,527,300	1856	2,974,493
1848	1,521,370	1857	2,359,013
1849	1,655,800	1858	2,688,133
1850	1,652,295	1859	2,501,634
1851	2,013,202		

The bulk of these importations have been consumed in England, and the quantity re-shipped for the Continent has been comparatively trifling in amount. We must yet allow some 500,000 lbs. shipped annually from Peru to France and Germany.

In 1836, the price was 8d. per lb. During the last ten years, the prices have fluctuated considerably, from 1s. 8d. per lb. to 3s. 9d.

It may be interesting to inquire whether this large supply will be continued, and I regret I am compelled to form the opinion that it will not, unless a change takes place in the manner in which the trade is conducted, unless justice and right are better observed, and unless the Indians (shepherds and owners of flocks) are considered as, and treated as, brother traders, instead of mere producers of raw material. I am fearful the sudden increase of the demand was the cause of greater efforts being made to meet it, which have not been attended by a corresponding effort to increase the number of the animals. I fear the practice of the Indian not to shear the female alpaca has been departed from, and a decrease in the flocks will result. It is true that the attention lately drawn to the value of the wool of the alpaca may also lead to a more intelligent system of cultivation; indeed, I learn from my brother that a friend of his who, in 1843, did not possess a single alpaca, in 1857 had 15,000 on a large estate held by him.

I will give you an example of how the "trade" is carried on:—"A party, by some means or other, procures the appointment of 'Governador' of a district, and quickly enters into a contract with some mercantile establishment on the coast for a supply of, say, 500 to 1,000 quintals (100lbs.) of alpaca wool at 50 dollars (Peruvian) per quintal. As soon as the contract is made he orders the appearance before him, on the day fixed, of all the 'Ylacatas,' chiefs, or heads of communities, within his jurisdiction; he then apportions the quantity of alpaca wool to be delivered by each, according to the number of alpacas possessed by the community he represents; payment in full is then made in ad-

vance, at rates varying from 10 dollars to 15 dollars per quintal—the wool thus collected is tightly pressed by the hands and feet into sacks, weighing 110 lb., and the Ylacatas are ordered to supply, in the same manner, the requisite number of llamas for the carriage of the wool to its destination. Any resistance on the part of Indians to supply the wool and llamas for its carriage is met by the Governador by imposition of most harassing gratuitous service to the State, such as repairs of roads, foot postmen, domestic servitude; and often by sending the party guilty of desiring to do what he thought fit with his own, as a recruit to the first regiment at hand, with "official" recommendation to the commandant thereof, that effectually prevents the Indian for a long time, and often for ever, again entertaining the dangerous and turbulent idea of opposing the wishes of his Governador. Do not suppose that the above is a sketch of an exception to the generality of those in authority over the Peruvian and Bolivian Indian—far, very far, from it; it is, indeed, the rule that actuates the conduct of sub-prefect to turnkey downwards, in all the provinces of the interior of those countries where the Indian is to be met with." If the Indian sees the Ylacata coming towards his hut, and divining his intent, runs away to hide himself, he does not avoid his persecutor. On his return he finds the money on the floor, or suspended in a bag from the rafters, with an intimation of the quantity of wool required at 10 to 15 dollars per quintal, and the time of delivery; he cannot help seeing it, and is obliged to take it and supply the wool. If he does not, his alpacas are shorn, and even then, if there is not wool enough to make up the quantity he is put in prison to force him to pay the deficit at the price contracted to the merchant, and, if this is not paid, his flocks of sheep, alpacas, llamas, &c., are sold to make up the amount.

As a beast of burthen the alpaca is little used, the Peruvian Indians have too much veneration for it, and would consider it a sacrilege so to use it. Europeans, however, occasionally make use of it, and, I believe, in the quicksilver mines of Huancavelica it is found nearly as useful as the llama, although the load it will carry is smaller.

The alpaca was formerly but little used for food by the Peruvian Indians; they seldom, if ever, killed it for the purpose, but would eat it when it died a natural death. Of course, when so obtained, it did not rank high. It has latterly been more used, and when young is by some considered delicate and nutritious.

There is still another animal which demands my attention, and which is probably destined to play a considerable part in the future history of wool-producing animals. I mean the cross between alpaca and the llama, called machurgas, from "machorra," a Spanish word, meaning 'a barren sheep,' of which there are frequent instances in Peru and Bolivia. Walton, in his work, says:—"From the alliance a beautiful hybrid results, if possible, finer to the eye than either parent, and also more easily trained to work, but, like the mule, it does not procreate;" in which he is confirmed by General O'Brien, who resided twenty years in Peru, ten of which he served as aide-de-camp to San Martin, the Liberator, a great traveller on the Andes, and a landed proprietor and miner. The General says:—"There is, however, a beautiful animal produced between the llama and alpaca, much handsomer in form and figure than either, also better adapted for work, but it does not breed. These are the animals I principally used at my mines to bring down the ores from the mountains."

In some parts of Peru and Bolivia, these animals, I am informed, are known by the name of guarisso, which is derived from the Quichua Indian, and signifies "a foul thing."

I am not about to enter into a discussion on the vexed question of "fixity of species." I must leave this to be settled by others much more competent to deal with such scientific questions than I profess myself to be, but I must direct their attention to this fact, that the opinions of Walton and O'Brien must now be considered as proved to have been entirely unfounded, my brother having bred animals to the third generation, from female machurgas or guarrissos, by reverting back to the original alpaca stock on the male side.

I find mention has recently been made of yet another animal, the aviru, said to exist in immense numbers in Patagonia, but whether this is a new species or a variety of the vicuna, has not yet been determined. A rug made from its skins, by the native Patagonians, was exhibited at a meeting of the Literary and Philosophical Society of Liverpool, 18th May, 1857.

It would, indeed, be surprising if animals, so useful to man in everyway as the llama and the alpaca, producing him food, clothing, both in the shape of skins and wool, and helping him in his labours, should not have created in the conquerors of Peru and Bolivia, and their successors, a desire to transfer them to their own countries. Such has been the case; many have been taken to various parts of Europe—royalty led the van, nobility followed—but, as might have been anticipated, the representatives of commerce have been most active. Time does not permit me to attempt any account of the llamas and alpacas that have been introduced into this country and other parts of Europe, which, notwithstanding all the care bestowed upon them, although they appear to breed, do not appear to have become perfectly acclimatised. They have been regarded more as specimens of rare and curious animals, fitted for the ornamentation of the parks of our nobility and gentry, than as an article of commerce. I will not here enter into a discussion of whether, under favourable circumstances, the alpaca might not be acclimatised in some parts of this country, I am rather inclined to the opinion that when we know more about it, and its peculiar habits and wants, it perhaps may. I am afraid the main cause why it has not, and perhaps will not, thrive with us, is the humidity of our atmosphere, and dampness of our soil, as well as the unsuitableness of our grasses for its sustenance. Its favourite food in its native country is the ichu or yeho, a rushy kind of grass, of which it is immoderately fond, and which I believe is not found in this country.

Many animals had been exported, and in 1844 the British Consul at Arica was requested to send home sixteen alpacas for her Majesty Queen Victoria, eight of which were shipped on board a vessel-of-war, and eight were brought to Liverpool by the *Octavia*. The day after their embarkation, General Yguain (then prefect of the department of Tacna) was perfectly furious at their having been placed beyond his reach, and raked up an old decree of 1829, strictly prohibiting the exportation of alpacas under very severe penalties, but which had remained a dead letter, seldom, if ever, put into operation, and the existence of which was almost unknown, and stopped the exportation of a further flock of 40 alpacas intended for Germany, appealing to the government at Lima to support his act, which resulted in a decree of Congress, April 5, 1845, prohibiting the exportation of alpacas in all the ports of Peru, imposing very severe penalties on those caught infringing the law, which has been strictly enforced up to this day.

This decree has not allayed, as it could not allay, the desire to possess them; opposition often becomes the parent of determination, and when a thing is denied to us we often attach a greater value to it than it deserves, and become more intent on its possession, even when it is not worthy of the efforts we make to obtain it.

The vast success that had attended the introduction of the Merino sheep into our Australian Colonies, and the supposed suitability of its climate and vegetation to the alpaca, led to many attempts being made to introduce them there but without success. My brother was led to consider a plan, which he ultimately executed, of getting them out of the country, for which he was peculiarly qualified by his long residence (from 1836), his intimate acquaintance with the inhabitants of the interior, and their languages and customs, acquired by having been the

representative of some of the first mercantile houses in the country in making contracts with the Indians for wool, bark, &c., and in frequent journeyings in their superintendence. He writes thus:—

"Several times, from 1845 to 1848, were applications made to me by different parties, to get alpacas out of the country, but as I well knew that any such attempt must be attended by difficulties of no ordinary nature I paid no attention to them. I began at that time to think that this valuable animal required being better known, and its habits studied, hoping that in course of time the decree would be annulled, or some revolution in the country would enable me to get them out through a Peruvian port. In the beginning of 1848, I rented a large estate, Chulluncayani, on the frontier of Peru and Bolivia, and among other occupations, such as collecting wools, copper from Corocoro, and Peruvian bark, commenced breeding the alpaca; little by little I collected at first 200; all sorts of stratagems had I to make use of to obtain these, and then they were old and many infirm ones; every means were devised by the Indians on the estate to prevent my breeding them, but after all, in 1851, I succeeded in being the possessor of more than 600."

In February, 1852, my brother entered into arrangements with a gentleman of Tacna to carry out the undertaking, and immediately started for his estate at Chulluncayani, and after giving directions that in December or January, when the fresh pasturage would begin to appear and render driving them practicable, they should commence their journey towards the frontier of the Argentine Confederation, he returned to Tacna, and went thence to Valparaiso, from which port he embarked on the 24th of December for Port Philip, *en route* for Sydney, for the purpose of ascertaining from personal inspection whether the country into which he was purposing to introduce the alpaca was adapted for its naturalisation. In the following March he landed at Twofold Bay, and in company with a Peruvian gentleman who had accompanied him, made some excursions for about 12 leagues inland, which satisfied him that "the country was most admirably adapted for the alpaca." On the 22nd of March he arrived at Sydney, where he "became more and more satisfied as to the adaptability of the country for successfully rearing the llama species. Here, as in South America, the climate is dry; it matters not how much rain may fall, even for eight days consecutively, the rarity of the air is not affected by it, there may be, no doubt there is, a difference in the atmosphere immediately before and after heavy rains, but I contend no difference exists in the rarity of the air." On the 21st May he left Sydney, arriving in Valparaiso July 3rd, where he was compelled to seek for a new partner in his enterprise, Mr. —— declining to go on with the matter, and even threatening to divulge the plan to the Government, and succeeded in concluding an arrangement with Messrs. Boardman, Dickson, and Co. (with others), for carrying out his project. Peru was then at war with Bolivia, and the attention of the latter government would naturally be called to its northern frontier, leaving the southern one, through which my brother proposed driving his flock, without troops, and comparatively open to him; accordingly, without delay, he went to Caldera, and thence to Copiapo, and commenced his preparations for crossing the Cordilleras to the province of Salta, in the Argentine Confederation, and thence into Bolivia, to endeavour personally to learn what had become of the animals he had directed, in the previous September, to be driven in that direction from Chulluncayani.

At Copiapo he again met with a Mr. Samuel W. de Blois, of Halifax, Nova Scotia, a fellow passenger from Sydney, who was desirous of seeing a part of the interior of South America, and he became his companion. Accordingly, on 17th September, 1853, my brother, Mr. De Blois, Pedro Cabrera, their guide, and Pablo Soza, as general servant, with 12 mules and two horses with bells to keep the mules together, left Copiapo, much against the opinion of many friends, it being considered too early to attempt the journey, Pedro, his guide, saying, "Certainly it was early, but with good mules it might be done." After encountering terrific storms of wind, drift snow and sand, and sustaining a loss of one horse and 2 mules, passing by the remains of a party of fifteen men and thirty mules that had perished two years before, besides frequently being reminded of the dangers of their journey by the skeletons of mules, oxen and donkeys, which clearly marked the road, on the 25th they attained the highest ridge, 12 000 feet above the level of the sea, and on the 27th arrived at Sangil, or St. Gil, the inhabitants of which could hardly believe any person so adventurous as to attempt the passes so early in the season. On 16th October, they arrived at Salta, 240 leagues from Copiapo. Salta has a population of 10,000, and the governor of the province resides here.

From Salta, Pedro was dispatched in search of the flock of alpacas, with directions to meet his master at San Christobal, distant 250 leagues, while my brother returned to Molinos with Mr. De Blois, with the intention of seeing him on his road back to Copiapo, and left him at Laguna Blanca on November 8, 1853. From this date to July, 1858, that of his arrival at Copiapo, with more than 300 llamas, alpacas, vicunas, and their cross products, my brother either procured from the Indians, or bred, great numbers of animals, more than 1,000 of which he succeeded in getting into the territory of the Argentine Confederation, but these numbers were being constantly reduced by the inclemency of the weather (losing 200 of them in one snow storm), the difficulty of obtaining food, and from his flock having drank of the water of a lake infested with leeches. A second time he was compelled to cross and re-cross the terrible Cordillera to obtain the necessary funds. "In January, 1854, it now became necessary for my proceeding to Salta, to receive the money that I expected Messrs. Boardman, Dickson and Co., would have placed there for me. On my arrival, some eight days afterwards, I found that they, in lieu of sending funds, had determined to relinquish participation in the speculation. Without hesitation, I immediately determined on proceeding to Valparaiso, and I accomplished the distance—240 leagues, or 720 miles—in nine days. I arrived just in time to catch the steamer passing Caldera for Valparaiso on the 10th February, and arrived in Valparaiso on the 12th. Since leaving Copiapo, on the 17th September, 1853, I had gone over more than 3,000 miles on mule back. Finding that Messrs. Boardman, Dickson, and Co., were determined to have nothing more to do with the speculation, I soon came to terms with Messrs. Waddington, Templeman, and Co., for carrying out the undertaking."

It would occupy more time than is allowed to me to trace month by month, or even year by year, the dangers, privations, and vicissitudes he, his shepherds, and his flocks passed through, during these following four years. They trench on the romantic. His mules and donkeys were frozen to death; two of his shepherds, with their mules, were dashed to pieces, by falling over precipices; he was taken for a political spy, which idea he did not discourage, as it enabled him to keep his true purpose disguised. Twice he was arrested, and once had to defend his flock from forcible seizure. The loss of upwards of 200 of his flock from drinking of the water of a leech infested lake, in the Calchaquies valleys compelled him to seek a new spot in which he could habituate his animals by degrees to the kind of food he would be compelled to depend upon for their maintenance during their sea voyage, and also to carry out a plan he had devised of improving the wool of the llama by crossing with the alpaca. This spot was Laguna Blanca, "one of the four valleys which commence from the high table-lands to the west of Tucuman up to the main chain of the Cordillera. It lies in about twenty-seven degrees south latitude, but is nevertheless surrounded by perpetual snow, which crowns the mountain peaks enclosing the

valley." Being satisfied that he had at length found a desirable spot for the propagation of the species, not only did he at length acquire a new flock of alpacas, acclimatised to temperatures less pure and rigorous than those in which their predecessors had been reared, but succeeded in educating them, to a certain extent, for the great voyage which lay before them. He built a hut of stones for himself and people, which furnished an indifferent shelter from the inclemency of the weather." For the animals, large yards were enclosed and provided with troughs, in which they were supplied with their daily rations of dry alfalfa, cut up and mixed with bran, to which they became gradually accustomed." On the arrival of the flock at Copiapo, after almost unexampled hardships and a separation from his family of six years, in May, 1858, great excitement was excited by their novelty. The city was almost deserted for several days, the people forming an uninterrupted procession between it and Punta Negra (a distance of six miles), where the flocks were at pasture. At length, in July, 1858, 322 animals were shipped at Copiapo on board the *Salvadora*, of 750 tons.

Respecting the manner in which these animals were got away, my brother says, "In no way have I infringed a single law of either Peru or Bolivia—to break or infringe a law or decree of a Government is one thing, to evade the intention is another thing. The decrees promulgated state that it is illegal to drive alpacas within a distance of 40 leagues of the sea-shore, and the penalty for so doing is the loss of the animals; and every person found with them, and the owners although not with them, are condemned to ten years labour in chains on the Chincha or Guano Islands. To smuggle alpacas out of Peru, if successfully accomplished, could be done in 20 days. To avoid being amenable to such law, is why I took such a round-about-way as getting the animals first into the Argentine provinces, and then into Chile for embarkation, in neither of which countries do such restrictions exist."

The fundamental principle of human society, laid down equally by statists and revealed law, is that "the profit of the earth is for all." For the sake of peace—of the settlement of property and society—of political expediency and the comity of nations,—that doctrine has, by the common consent of states, undergone modification; but the title of all mankind to inherit the common bounties of the Creator, and the varied gifts of nature, is still the governing principle of political ethics. The Chinese war has by many been deemed sufficiently justified, on the ground that no people are entitled to seal up their territory from the general intercourse of mankind, and to withhold the contribution of their peculiar products from the common stock of human enjoyment.

Of all regions of the earth that of South America is the most dependent on other countries for useful products. When discovered, it had neither horse, ox, sheep, or pig. All those have been presented to it by the Old World, and Peru requites these gifts by the positive prohibition of the export of its most valuable animal product, thus refusing to mankind a participation in the benefits it is calculated to confer.

The government of Peru has not imposed a heavy tax on the export of the alpaca. It has not restricted it, confined it within stringent conditions, or regulated the export by irksome custom-house regulations. My brother would willingly have paid any amount of taxation, or complied with any conditions the government might impose, but it would make no terms, listen to no conditions, hear of no compromise. It insisted on the preservation of a monopoly of an animal whose produce was so useful to man, in violation of that impartiality of commercial intercourse which friendly nations were entitled to expect from its laws. It acted upon the anti-social and anti-mercantile maxim, of appropriating exclusively to itself a gift and blessing intended for the common benefit of mankind. I say unhesitatingly, that it is a much smaller breach of the strict law of political or commercial morality to evade or even to break such a law than it is to make it, and that the obligations of patriotism impelled my brother "to do a great right by doing a little wrong," in the evasion of a prohibition contrary to the laws of nature, and inimical to the interests of mankind. I may add, that if my brother's act may be called by some, politically or commercially, not strictly moral, he at least sins in very respectable company.

The introduction of one of the earliest flocks of Merino sheep into this country was accomplished under very similar circumstances. Geo. III., in 1787, determined to give them a fair trial, and a few from one flock and a few from another were collected in Estramadura on the borders of Portugal, and as they could not be shipped from any Spanish port without a licence from the King of Spain, they were driven through Portugal, and from thence conducted to the king's farm at Kew.

On the 28th November, 1858, this flock, consisting of 276 animals, arrived at Sydney and were immediately landed and temporarily located in the Government domain. I find, by an official report from my brother to the secretary for lands and public works, dated 16th April, 1859, that the flock then consisted of:—

46	Male alpacas, pure breed.
38	Female alpacas, pure breed.
110	Female llamas.
27	Females, cross-bred, between alpaca and llama, in first generation.
11	Females, cross-bred, between male alpaca and female, from first cross.
5	Females, cross-bred, between male alpaca and female, from second cross.
40	Lambs of first, second, and third cross.
4	Male vicunas.
1	Female vicuna.
1	Male cut llama, carrier.
283	

All much improved in condition since landing.

After a short sojourn at the town domain, the flock was sent to Liverpool, about twenty miles from Sydney, until a permanent locality could be fixed upon for them.

The idea of conferring on our Australian Colonies the immense advantages anticipated to follow on the introduction of an animal so valuable as the alpaca appears to have almost simultaneously presented it to the minds of several individuals.

Mr. Titus Salt, whose name is and ever will remain so intimately associated with this subject, might naturally be supposed to take a deep interest in it, and finding that the alpacas he had obtained from the late Earl of Derby and from other sources did not prosper here so well as he could wish, he sent two small lots to different parts of Australia, thus becoming, I believe, entitled to the distinction of the first introducer of the alpaca into our Australian Colonies. I find one flock of four arrived in the *Marshal Pelissier*, at Adelaide, consigned to a Mr. Haigh, of Port Lincoln, in March, 1857, to whom they were immediately forwarded.

Mr. Haigh writes, 7th Nov., 1860:—"The alpacas are not doing well. They have only increased one; the rest have all died. We lost one the other day, about two years old; it was quite fat, and looked healthy." The number was too small.

In July, 1858, Mr. Salt sent out to Mr. Matthew Moorhouse, Riverton, South Australia, two males and three females. One of each sex died on the passage. The other females have bred, but only one of the lambs has been reared.

A Mr. Eugene Roehn succeeded in procuring a flock of llamas and cross-breeds, which he drove overland from Peru to Guayaquil, and thence to Panama. From Panama they were taken to New York, where Mr. Benjamin Whitehead Gee purchased them, and brought them to England, where they were exhibited at Glasgow and

Birmingham, and then brought to London, and depastured in a park at Ealing. Ten of these animals were purchased by Mr. George A. Lloyd, of London, and sent in June, 1858, to Sydney, where they arrived 8th November, 1858, and produced £600. This flock was sent on to Moreton Bay. I have not been able to learn how they get on; the much larger and more valuable flock of my brother has perhaps absorbed all interest on the subject. Twenty-three of Mr. Gee's flock were purchased by a committee of Australian merchants, Mr. Edward Wilson, a name now well-known from his efforts in the acclimatisation of animals, birds, and fishes, Mr. Mackinnon and Mr. Westgarth being among the number, and shipped to Melbourne, where they arrived about February, 1859, and have, up to the present time, gone on excellently. (See Mr. C. Ledger's report, 30th October, 1860.)

While I thus cheerfully and willingly give to those who have laboured in the same field of industry, and yield to them the honour of priority in the introduction of the alpaca in Australia, I think my brother is justly entitled to the honour of being esteemed the largest, the principal importer; I believe there is no record of an attempt at acclimatisation being effected on so large, so stupendous a scale as that accomplished by him, and at so great a sacrifice of time, labour, and money.

In endeavouring to estimate the capabilities of a country for the successful and profitable maintenance of an animal new to its history, we must look first to its climate, and secondly to the food which it produces, and see if the one is suitable, and the other supplies what is required by the animal for its full development. An animal cannot be regarded as perfectly acclimatised until it is demonstrated that it can live in the locality to which it is introduced, as well as in its native country; that its produce can be turned to useful purposes; and that agriculturists will find their advantage in rearing it on an extensive scale.

I have already informed you that my brother was convinced, by the somewhat hasty visit he made to Sydney in 1853, of the adaptability of the climate and pasturage of the country to the alpaca, and of this he became daily more and more impressed while they were depasturing at Liverpool.

In May, 1859, the Government directed him to make a tour of inspection into the interior, with the view of ascertaining the most favourable part of the colony for depasturing the animals. He started in July. His report is now before me:—

THE SUPERINTENDENT OF ALPACAS TO THE SECRETARY FOR LANDS AND PUBLIC WORKS.

Liverpool, 23rd August, 1859.

SIR,—I do myself the honour to lay before you a report of my tour of inspection of a portion of this colony, undertaken by your direction, in search of suitable country for permanently locating the flock of alpacas, llamas, and vicunas.

In doing so, I beg to state that my own observations of the capabilities of the country, or districts thereof, I visited for affording pasturage to the flock, are confirmed by the opinion of a Peruvian gentleman, who, with the sanction of the Government, accompanied me on my tour.

I started from Liverpool on the 6th July last, and proceeded along the Southern Road as far as Yass, extending my observations of the country over an area of four or five miles, and occasionally a greater distance, on either side of the road. From Yass I directed my course to the Murrumbidgee, whence, *viâ* Queanbeyan, Micaliago, and Bredbo, I entered Maneroo. A careful examination of the Bredalbane and Yass Plains convinced me of their suitability to the rearing of the alpacas; the neighbourhood of Micaliago, Bredbo, struck me as no less suitable. My opinion of the adaptation of these places to the above purpose is based chiefly on the marked identity of the natural features of the country with those of that part of South America from which the alpacas came. The country all through Maneroo indeed corresponded so exactly with that of Peru and Bolivia, that I could easily believe myself back again in those countries. This similarity was still more apparent with respect to the Snowy Mountains, as that magnificent range appeared clad in their winter garb; Koskiusko reminded us of the Sorata or Yllimani, and, with the Australian Cordilleras in full view, we remembered our trials and hardships among the ranges of their more stupendous and more terrible counterparts of South America.

But it was, of course, on the natural pasturage of these places, as the most important object in our examination, that we bestowed the greatest attention. Not only are the pasturage and herbage, rocks and stones, identical with those of Peru, but I found throughout the districts I have indicated abundance of a description of wiry grass known as the "ichu" of South America. It is upon this grass that the llama tribe mostly feed, being extremely palatable and nourishing, and of which they are immoderately fond. The great importance of furnishing the alpacas with fodder as closely as possible resembling that on which they have been accustomed to feed in their native country, need scarcely be pointed out. It was accordingly my deliberate conviction, and also that of my companion, that the Maneroo district was admirably adapted for the location of the alpacas. Should the Government determine on locating the flock in that district, I would recommend for the purpose the country contiguous to the Snowy River, on account of the facilities which the undulating plains and mountain ranges would afford in obtaining a change of temperature whenever the removal of the flock to a warmer or cooler spot should be desirable. By continual thermometrical observations I found that a similarity of temperature existed in the months of July and August at Maneroo, to that of the country from which the alpacas were extracted; the thermometer at 7h. 30m., varying from twenty-four to thirty-one degrees.

The only thing I found to cause any apprehension was the existence of "fluke" in the sheep; in South America its ravages are counteracted by not allowing sheep, cattle, or llamas to drink the stagnant waters that might be formed from springs, lakes, or ponds; puddles formed by rain are not supposed to cause the disease.

I beg to recommend that the animals be moved up to Maneroo with as little delay as possible; and as my personal attention is necessary, I beg to request you will think fit to relieve me from my intended journey to New England, at least for the present.—I have, &c.,

C. LEDGER.

The Honourable the Secretary for Lands and Public Works.

The spot selected is called Nimity Bell, between Bombala and Cooma, in the Maneroo district, 260 miles from Sydney.

Before the animals left Liverpool for Arthursleigh on their way to the locality thus selected, about 200 were shorn, in November, 1859. The wool produced was about 6 cwt. of three sorts, alpaca, llama, and cross bred, and valued (by sample) by Messrs. Foster and Sons, of Bradford, at from 15d. to 2s. 2d. per pound, objection being made to the shortness of the staple.

Mr. Titus Salt bought the bulk, and has favoured me with a report. "Bale No. 1 contains only a few fair average fleeces, the great bulk being too short in the staple (supposed from being clipped too early), some of the fleeces are slightly crossed with llama."

"Bale No. 2 is divided into two divisions; the smaller one seems to be nearly all pure alpaca, but has also been clipped too soon, consequently it is too short for combing."

The prices paid, were from 9d. to 18d. per lb., which appears to have been caused by the staple being too short, in consequence of too early clipping. It is to be hoped this will be remedied in future.

In addition to this official report, I find from private letters my brother says:—"The chain of snow-covered mountains that suddenly presented themselves to my view, on ascending a hill from Cooma, brought most vividly be-

fore me remembrances of past privations and hardships endured among the grand and stupendous Cordilleras; and I gazed with delight and enthusiasm on a landscape similar to those my eye had so continually scanned while on my hazardous journeyings through Peru, Bolivia, and Chili." Many writers on the alpaca, &c., are of opinion that without the ichu grass these animals will not thrive. This grass is found in South America, in Peru, and Bolivia only; and although the Andes extend from Patagonia to Panama, it is in Peru and Bolivia only that the alpaca is found. From inquiries I have made, I believe this ichu grass is not known in this country, except in botanical collections, and I am led to conclude that the failure of the alpaca with us is mainly to be attributed to this fact, while its presence in Australia, as well as in Peru and Bolivia, justify the anticipation of their acclimatisation in our Australian colonies.

My brother writes to me at various periods:—

"So far the animals are thriving well and augmenting in number."

"The lambs are a most decided success, that is those born in the colony."

"I am on my road to Maneroo with the animals. It will take me nearly two months to drive the flock there—close on 300 miles. I really think that the speculation is a great success (not pecuniary to me). The lambs born here are a great success, indeed. Only fancy! I write this from the house of the famous M'Arthur, of Merino sheep celebrity, and the alpacas are grazing in his park, part of the princely 'run' granted to him for introducing the Merino sheep into Australia."

"I am glad to say the animals are thriving wonderfully, of their success I have no doubt."

"I am perfectly convinced that the alpaca will in due time produce immense results to this colony, its acclimatisation and adaptability are no longer problematical, it is undoubtedly an immense success; the flocks are in magnificent order and thriving wonderfully."

"I am glad to tell you the flocks are thriving admirably. I do not for a moment doubt their complete success."

"We have had more than a month of continued rain, and, although the animals were fully exposed to it, I did not lose one; and at this season of the year they are more susceptible of inclement weather than at any other, on account of the pasturage being more scarce and less nourishing."

The amount of rain which falls on the earth's surface is exceedingly varied, but the moisture of a climate does not wholly depend upon the amount of rain registered by a rain-guage; for some climates are humid, and yet not rainy; others dry, and yet subject to periodical torrents.

My brother writes to a friend as follows:—

"As you are one of the few who feel deeply interested in the success of the alpacas, and sympathise with my enthusiasm, I am sure you will not be wearied of my frequently writing to you about them. I send you specimens of wool, from animals of first cross between llamas and alpacas. It was born on the 27th April last. It is, therefore, of Arthursleigh growth, and I contend that alpaca wool was never grown at the same rate in Peru. It is truly astonishing. The length of staple and quality are beyond my fondest expectations. The animal yielding it is now little over five months' old, and would now clip fully 7lb. All are in the same state. The fact is, that in this country we shall soon astonish Peru, and I hope to send fleeces, grown at Arthursleigh, to the next exhibition in London, that will astonish Europe, too! Send the enclosed specimens to your son in England, and let him show his friends what Arthursleigh is doing."

Since the foregoing was written I have received the *Sydney Morning Herald*, December 21, 1860, from which I extract: "Since the arrival of the flock of alpacas at Arthursleigh, the animals have thriven even beyond the most sanguine expectations of Mr. Ledger, so that the ultimate success of the importation is now placed beyond doubt. The present is the proper season for lambing, and the yield hitherto has been very promising. The number of the flock is now 311, and Mr. Ledger expects that by the end of March next it will have increased to 360. It is Mr. Ledger's intention, in future, to make October the lambing month. In Peru the Indians could not be induced to shear oftener than every other year, the manufacturers having fitted their machinery for a length of staple of two years growth, the practice of the Indians must be adopted here, otherwise our produce would be depreciated on account of the shortness of staple."

My brother took to Melbourne two of his pure male alpacas, two having previously been sent, which had been given to the government of that colony by the Sydney government.

I will conclude this part of my subject with a part of a Report on the state of the Melbourne flock, which I have already told you was presented to the colony by a committee of gentlemen who organised a subscription here for that purpose.

Sir,—I have been delighted to have had the opportunity of personally verifying the statement made to me, by my overseer, Pedro Cabrera, on his return to Sydney from this city, as to the splendid condition of your flock of llamas; and I unhesitatingly declare that in their native country it would be impossible to meet with any to surpass, and I very much doubt to equal it.

"I class your stock of llamas as of inferior breed, in size of animal, quantity, and quality of fleece.

"By continually crossing the female llama and its female progeny with pure male alpacas up to the seventh cross, purity of alpaca blood most undoubtedly will be obtained.

"There should not exist a chance of retrogression of breed. Every stage of crossing should be progressive, until arriving at the same purity as the male alpacas the Government of New South Wales has forwarded to you.

"I would strenuously recommend the preservation of the flock intact, until such time as every trace or sign of llama blood be eradicated.

"This species of animal requires a dry and pure atmosphere. Humidity under foot does them no harm, unless compelled at night to repose on wet ground.

"I would recommend their being exposed to every vicissitude, changing their folds every now and then during wet weather, so long as they are confined to a limited space for grazing on.

"This animal, when left to itself, at nightfall generally selects a sloping ground for reposing on.

"In my opinion it would be desirable to confine them as much as possible exclusively to the natural grasses of the country.

"The acclimatization of the alpaca and llama in Australia is now proved beyond a doubt. The smaller flock in this colony, and the larger one in that of New South Wales, have fully satisfied me as to the adaptability of this peculiar animal to the climate and natural grasses of the country.

"This animal is freer from constitutional diseases than ordinary sheep; less subject to those arising from repletion and exposure to rain. Foot rot, catarrh, and bottle, are unknown to them.

"Neither are its young exposed to those accidents liable to befall the lamb of sheep.

"The mothers are provident and careful nurses, nor do the young ones require any aid to make them suck.

"Except at the rutting season, these animals stand in no need of attention; the shepherd need only visit them occasionally; and such are their gregarious habits, that the members of one flock seldom stray away and mix with others, being kept in a good state of discipline by the old ones, who know their own grounds, and become attached to the place of their nativity, to which they return at

night, evincing an astonishing vigilance and sagacity in keeping the young ones together and free from harm.

"By trials, careful study, and intimate knowledge of the alpaca, after an almost daily association with this interesting animal of 22 years in South America, and two in Australia, it is placed beyond a doubt in my mind, that this animal may be naturalised and made to readily propagate in almost any clime; and every day the facilities and the efficacy of their proper breeding must become more apparent.

"The hardy nature and contented disposition of the alpaca, its extreme docility, and gregarious habits, cause it to adapt itself to almost any soil or situation, provided the air is pure and the heat not too oppressive.

"I had innumerable proofs of its hardiness, and its power to endure cold, heat, damp, confinement, hunger, and thirst, vicissitudes to which it is constantly exposed on its native mountains.

"It is almost superfluous on my part, to assure you that at all times I will readily furnish all and every information in my power to give regarding this animal; as also willingly aid by supplying, from time to time, as you may consider necessary, such pure male alpacas as may be required to improve and finally raise your stock to uniformity and purity of blood.

"I will only further add, that the ratio of increase in your flock has far exceeded that in the flock under my charge.

"I have the honour to be, Sir,

"Your obedient servant,

"C. LEDGER.

"**Melbourne, October 30, 1860.**"

In endeavouring to estimate what may be the results to our colonies of the introduction of the alpaca, let us look at what has resulted from the introduction of the sheep. In January, 1788, the population of New South Wales was 1,030, and its stock consisted of one bull, three cows, one stallion, three mares, and three colts. (Fairfax.) In 1788 Australia had no sheep of its own, the kangaroo and the dingoe were the only animals of any size that it possessed; and the first taken into the colony were procured from Bengal to provide the colonists with mutton and wool. These animals produced hair rather than wool. They are described in Widdowson's work as possessing "large heads, Roman noses, and slouch ears; they were extremely narrow in the chest; they had plain and narrow shoulders, very high curved backs, a coarse, hairy fleece, and tremendously long legs." By crossing these hair-bearing ewes with an Irish ram, Captain Macarthur effected great improvement, and he was persuaded that the introduction of the Merino sheep into the Colony would be of the utmost consequence, and in 1797 succeeded, with the aid of Captain Waterhouse, of H.M. Navy, in procuring a small flock of three rams and five ewes from the Cape of Good Hope, originally brought from Holland, which he had the satisfaction of seeing rapidly increase, their fleece augment in weight, and the wool very visibly improve in quality. He crossed all the mixed-bred ewes of which his flock had previously consisted, with the Merino rams. The lambs produced from this cross were much improved; but the produce from the second cross far exceeded his most sanguine expectations. He expressed the opinion that in the fourth cross no distinction would be perceptible between the pure and the mixed breed. In 1796 the public and private stock of sheep in the Colony amounted to 1,531; in 1801, to 6,757, which is 633 over and beyond a calculation of Captain Macarthur on the basis that they would double themselves in two and a half years.

The following is a return of live stock in the colony of New South Wales from the year 1848 to 1857, inclusive:

Year.	Horses.	Horned Cattle.	Pigs.	Sheep.
1848	97,400	1,366,164	65,216	6,530,542
1849	105,126	1,463,651	52,902	6,784,494
1850	111,458	1,374,968	52,371	7,092,209
1851	116,397	1,375,257	65,510	7,396,895
1552	123,404	1,495,984	78,559	7,707,917
1853	139,765	1,552,285	71,395	7,929,708
1854	148,851	1,576,750	63,255	8,144,119
1855	158,159	1,858,407	68,091	8,602,499
1856	168,929	2,023,418	105,998	7,736,323
1857	180,053	2,148,664	109,166	8,139,162
1859	200,713	2,110,604	92,843	7,581,762

As these non-indigenous animals have thriven here so wonderfully, as they have also done in South America, and there appears to be considerable similarity between the two countries in temperature, climate, mountainous elevation, and natural pasturage, am I not justified in anticipating a glorious future for the alpaca in Australia?

The following is the quantity of wool imported into the United Kingdom from all our Australian colonies:—

	lbs.		lbs.
1820	99,415	1841	12,399,362
1821	175,433	1842	12,979,856
1822	138,498	1843	17,433,780
1823	477,261	1844	17,602,247
1824	382,907	1845	24,177,317
1825	323,995	1846	21,789,346
1826	1,106,302	1847	26,056,815
1827	512,758	1848	30,034,567
1828	1,574,186	1849	35,879,171
1829	1,838,642	1850	39,018,221
1830	1,967,309	1851	41,810,117
1831	2,493,337	1852	43,197,301
1832	2,377,057	1853	47,076,010
1833	3,516,869	1854	47,489,650
1834	3,558,091	1855	49,142,306
1835	4,201,301	1856	52,052,139
1836	4,996,645	1857	49,209,655
1837	7,060,525	1858	51,104,560
1838	7,837,423	1859	53,700,542
1839	10,128,774	1860	55,270,776
1840	9,721,243	To 31st October.	

I have already shown you how the exportation of alpaca wool from South America has of late years increased; I now give the following calculation, made on the probable growth of our alpaca flocks in fifty years—a long time in the life of a man, a short period in the history of a people:—

We commence in 1861 with 200 females, 50 males = 250.

Females.	Lambs.	Males.	Females.		Total. Males.	Total. Females.	December.
200	would yield 120	60	60	at 60 per cent. (allowing 10 per cent. for deaths) ...	110	280	1861
200	,, 120	60	60	,, ,, Those dropt last year will not lamb.	170	320	1862
280	,, 160	80	80	,, ,, The female lambs 1861 will drop this	250	400	1863
340	,, 200	100	100	,, ,, ,, ,, 1862 ,,	350	500	1864
420	,, 250	125	125	,, ,, ,, ,, 1863 ,,	475	625	1865
520	,, 260	130	130	at 50 per cent. only ,, 1864 ,,	605	775	1866
645	,, 320	160	160	,, ,, ,, ,, 1865 ,,	765	935	1867
775	,, 387	190	190	,, ,, ,, ,, 1866 ,,	955	1165	1868
935	,, 467	235	235	,, ,, ,, ,, 1867 ,,	1195	1400	1869
1322	,, 661	330	330	,, ,, ,, ,, 1868 ,,	1520	1730	1870

There will be, after deduction made for wear and tear, accidents, &c., 3250, as per above calculation. I further deduct 25 per cent. of total every period of ten years, thus leaving in round numbers 2500; at same rate, in

20 years, there would be			20,000
30	,,	,,	160,000
40	,,	,,	1,280,000
50	,,	,,	9,760,000

At 7 lbs. wool—each 68,320,000 lbs., at 2s. per lb., £6,832,000!

From this it will be seen that, making deductions of a liberal nature, according to the present ratio of increase there will be in fifty years 9,760,000 head, the wool of which at 2s. per lb., will amount to the sum of £6,832,000 per annum.

When figures like these are given, incredulity is naturally awakened; but I do not know that there is anything unreasonable in the calculation. At all events, any reasonable reduction may be made and still leave a value sufficient to deserve the energy and solicitude of the public.

This is not my own calculation, I take it from the *Sydney Morning Herald*, of 3rd of August, 1860, and my brother thus writes respecting it:—

"Sir,—In your edition of 3rd instant I have read an article on the probable result, fifty years hence, of the alpacas, llamas, &c., introduced by me into this colony in November, 1858. I see nothing improbable as to such anticipations being realised; on the contrary, my experience of this animal, in South America and in this country, fully warrants the estimates, referred to as being effected every ten years, being carried out.

"Two hundred breeding females, and fifty males, produce, as per said calculation, 3,250 in ten years, or equivalent to multiplying original stock by twelve; continuing at the same ratio, the second period would bring 39,000. Now, instead of following up at that rate, and so as to make all and every allowance for unforeseen contingencies of epidemics, bad seasons, &c., I deduct furthermore one-third, and multiply by eight instead of twelve, still reducing the 20 per cent. periodically ten years, giving, at the end of fifty years, 5,606,720 animals, which, at 7 lbs. wool only = 39,247,040, at 2s. per lb. = £4,924,704.

"The figures are large, no doubt; the time, too, is long. I do not wish to appear a visionary Utopian, although an ardent enthusiast, and hope I may not, through excess thereof, have been led into exaggeration. Figures, something like the above, I worked out nine years ago; they often appeared before me—in my mind's eye—during my solitary journeys, and more than once urged me to persevere, when, 'to hope seemed hopeless.'"

It will be borne in mind, that while the sheep has increased in the manner I have shown you, mutton has not been an article of food prohibited at the tables of our antipodean relatives; indeed, at the period of the immense influx of a new population, tempted by the recent discoveries of gold, fears were entertained that the appetites of the diggers joined to the desertion of the flocks, might act prejudicially on the interests of the wool trade; time, however, has proved this alarming anticipation to have been unfounded.

Notwithstanding the enormous draught constantly made on the flocks to supply the daily demands for food, notwithstanding whole flocks were consigned to the boilers by their panic-stricken owners, notwithstanding disease, caused and rendered more destructive by desertion, swept away large numbers, they are not now diminished, but show a steady increase.

A fortunate climate and an intelligent devotion to the rearing of sheep has prevented so great a calamity. Regions long thought barren, are now showing abundant pasturage. Irrigation, hitherto unthought of, has supplied, and in the future will supply, the only deficiency of which the country has to complain. The alpaca, living to the age of 14 to 16 years, and not like the sheep, having daily demands upon its numbers for the purposes of food, is more likely to fulfil the calculations I have given to you. By feeding on a coarser pasturage than the sheep, it will benefit the owner of land by bringing into use portions hitherto unproductive. It will bring more capital into operation. Labour will become employed in the new product; the shepherd tending the flocks; the sailor in transporting it to the seat of manufacture; the spinner and weaver, in forming it into the beautiful fabrics that spring from the looms of Bradford and Saltaire. The ship-owner and the merchant also will reap a profit while the wool is passing through their hands or is under their charge, and various classes of labourers will gain a portion of their means of existence in passing the wool from place to place, and from hand to hand in the various phases it must pass through from the raw state until it is displayed as clothing on our persons.

DISCUSSION.

The Chairman said it was now his duty to ask gentlemen present, who possessed any information upon this subject, to discuss the various topics suggested by the interesting paper they had just heard. There were many points which were worthy of notice:—first of all, the energy of an individual gentleman who, under great difficulties, introduced a new species of animal into our Australian colonies; secondly, the importance of promoting an increased production of wool when our supply of cotton might be in danger; and thirdly, the necessity which the present state of events imposed upon us of encouraging, by every means in our power, the production and importation into this country of the largest possible supply of raw materials of every kind. He believed there were gentlemen present who were qualified to give them information upon the wool trade and the fitness of the alpaca for Australia. There was one gentleman in particular to whom reference was made in the paper, and he was sure the meeting would be glad to hear the observations of Mr. Macarthur.

Mr. Macarthur had no information to convey with respect to the alpaca, for he was sorry to say he knew nothing of the habits of that animal beyond what might be acquired by cursory reading. Before he left New South Wales he had the opportunity of once or twice seeing the flock of alpacas introduced by Mr. Ledger, and he had no hesitation in saying that the paper read that evening conveyed a mass of most interesting information on the subject. The period during which Mr. Ledger had devoted himself to this object was somewhere about 22 years, and for nine years he was separated from his family in pursuing this enterprise. He mentioned this fact, in order that the meeting might appreciate the great exertions which had been made by Mr. Ledger in accomplishing his object. A vast sum of money was requisite for this purpose; he believed the amount was not less than between £4,000 and £5,000, which was the value put upon the flock at Sydney, and he knew that the amount occasioned difficulty in forming a company to undertake the purchase of the flock and the production of wool. It was considered too large a speculation, and required too much money for the settlers in a young colony to embark in it. The government, therefore, he thought very properly, stepped in and assisted Mr. Ledger under those circumstances, for there could be no doubt this was just one of those occasions when the government might intervene to supply the place of individual enterprise. It was hardly to be expected that two or three individuals, or even a company of persons, should embark upon a speculation of this kind, and, moreover, Mr. Ledger was then comparatively a stranger in the country; but the government having thoroughly investigated the subject, determined to interpose and make arrangements with Mr. Ledger for the accomplishment of the important object he had introduced

to their notice. He was glad to see, from the papers which arrived a few days since, that there were strong probabilities of some advantageous arrangement being made by which the government would divest itself of the property in the alpacas and make them over once more to Mr. Ledger himself. No doubt that was the most advantageous course that could be adopted, as it was not a matter in which the government should engage itself, unless under the exceptional circumstances which had been stated. The suitability of Australia for a wool growing country had been established by the figures relating to that commodity which had been given in the paper, and did not require any corroboration from him. There was one fact which he had noted as very remarkable—that was the statement contained in a letter from Mr. Ledger, from Arthursleigh, as to the great length and fineness of the alpaca wool produced in Australia, as compared with that of the animal in its native country. That agreed with the characteristic of the merino wool produced in Australia, which was remarkable for its greater length and strength, as well as the fineness of the staple. He recollected that, some 30 years ago, it was a subject of complaint amongst the woollen manufacturers that the wool of Australia was of too short a staple to be of much use to them for cloth; and it was then applied to other articles of manufacture, particularly mousselines-de-laine, which were principally made of Australian wool. The wool, however, now was of a much longer staple, and was particularly noticeable for its softness, especially the Merino wool. He would not attempt to enter into a calculation of the vast extent of country in Australia that was suitable for pasturage, both of sheep and llamas. He thought this country had reason to congratulate itself upon the fact that Australia was likely to produce a very large supply not only of sheep's wool, but also of that description of fleece which had been stated to be so valuable for other classes of manufactures, and there was no saying to what purposes the genius of our British manufacturers might not apply the wool of the alpaca when it came into the market in sufficient quantity to make it worth their while to turn their attention more especially to it. Referring again to the pasturage capabilities of Australia, Mr. Macarthur alluded to the communications recently made to the Geographical Society by Mr. Stuart, showing that the interior of the country was not, as was previously supposed, desert. This had always been his own opinion, and he was happy to find it corroborated by so eminent an explorer as Mr. Stuart. Whilst the western portion of the country varied in elevation from 1,100 to as high as 7,000 or 8,000 feet, the average elevation of the table land was not more than from 1,500 to 2,000 feet, which ensured a very temperate climate; and the late Sir Thomas Mitchell, who was a great explorer of the interior, in his work upon tropical Australia, spoke of having experienced nights of intense cold within that tropical region; so that the variations of climate which that country exhibited might be considered as affording all the essentials requisite for the successful growth of the llama wool, and the same remark was equally applicable to cotton, some very fine specimens of that commodity having been already produced in Australia.

Mr. F. T. Buckland expressed his high gratification at the information conveyed by the paper, and also at the magnificent specimens of wool upon the table. He hoped they would not rest contented with introducing the alpaca into Australia alone. He thought they ought to try the experiment in this country, and when they saw the beautiful garments which were produced from this wool, he was sure they would have the aid of the ladies in bringing such animals into England. He thought that both the alpaca and the llama would thrive well in this country. They had been told that very fine wool had been obtained from the animals in the possession of Miss Burdett Coutts, which were living not more than three miles from London; and his friend, Mr. Waterhouse Hawkins, could tell them that the animals did well in Lord Derby's park in the north of England.

Mr. P. L. Simmonds said that at the outset of his paper, Mr. Ledger had observed that probably it might be asked what interest had this country in a question of seemingly local interest like the introduction of the alpaca into Australia? To this he (Mr. Simmonds) would respond, that Great Britain, as a manufacturing country, had the greatest interest in promoting the extended production of wool in all countries, and more especially in her own colonies. The wool manufacture—the second of the great manufacturing interests—which engaged a capital at the present time for raw material, labour, machinery, and value of goods made, of fully £40,000,000, was, like the other great textile industries, insufficiently supplied with raw material for the enhanced demands made upon it for home consumption and export. Large as had been the increased production of wool in our African and Australian colonies, yet, with the competition from continental buyers, we were stinted in supplies, and had to pay enhanced prices for what we did get. And, what was worse, our manufacturers were driven to the use of ragwool or shoddy, to the extent of 50,000,000 lbs. a year. To meet the demand last year, with a deficient home clip, and with largely increased exports of home and colonial wools, the deficiency in supply for our woollen manufacturers became very apparent. Any increased supplies of wool for the present or future, would be of the greatest benefit to the kingdom. Hence he looked with hopeful interest to the efforts of Mr. Ledger in Australia, and to the information which had been laid before them that evening as to the probable results of acclimatising the alpaca there. As the meeting had just heard, it was only a quarter of a century ago that alpaca wool was first introduced into this country, and for the first five years the average imports were only 560,000 lbs. In the last five years the imports had averaged 2,600,000 lbs. per annum, and the advance in price in this period had been from 10d. to 2s. 6d. per lb. Constant as was the demand for this valuable long wool, which had been the making of Bradford, the supply had been almost stationary for the last five or six years, and Mr. Ledger had told them would probably decrease instead of increase, and in that case, where was Saltaire to find a substitute? They had heard that evening that the alpaca had now been introduced into the three principal Australian colonies, and with every prospect of their doing well. For his part, looking at the wide extent of the country, the varied climate and temperature, the elevated regions that were to be met with in different localities, from Queensland in the north to Victoria in the south, that the pasturage agreed with them, and that even their tall, favourite grass or reed, the *ichu*, was found indigenous in New South Wales, he saw no reason why they should not prove a success. At all events, the accounts they had heard, both from Mr. Ledger and Mr. Macarthur, went to disprove the opinion so confidently advanced on a previous evening, that Australia was totally unfitted in every respect for the alpaca. Many years, ago he (Mr. Simmonds) had advocated in his *Colonial Magazine* and other publications he was connected with, the introduction of the camel and the alpaca into Australia. Had the camel been earlier introduced they might not now have had to mourn the loss of Dr. Leichhardt and other enterprising explorers who had lost their lives in penetrating the great interior of that continent. He hoped also to see soon the vicuna and the guanaco introduced into Australia, for although less valuable as wool-bearing animals, yet they might aid the supply of food hereafter, and fill the place of the kangaroo, which was being fast exterminated. These animals, which ranged in such numbers from La Plata and Chili almost down to Cape Horn, would require no care, but would find abundance of food and suitable localities in Australia. It was even possible that the alpaca might be successfully introduced and naturalised in many other parts of the British posses-

sions, such as Tasmania and New Zealand, parts of the Cape Colony, Natal and India, and in Vancouver and British Columbia. But these were matters for future consideration. There might, and doubtless would, be failures, but useful enterprises, because they were new and apparently difficult, should not be discouraged or opposed by either sarcasms or sneers. When it was remembered how many animals, natives of tropical countries, were even now kept in health in so changeable a climate as Great Britain, there was hopeful encouragement for experiments under more congenial latitudes. Such efforts as those of Mr. Ledger were calculated to be highly beneficial to the colonies and to the mother country, and to stimulate others to exertion and enterprise in a similar direction.

Mr. B. W. Gee said his name having been mentioned with some prominence in the paper, he would offer a few remarks. A residence of many years in Australia enabled him fully to confirm the statements they had heard that evening, as to the adaptability of that country for the introduction of animals of the llama genus. Some eight or nine years ago some gentlemen in Sydney subscribed a sum of money for the purpose of sending agents into Peru to obtain a stock of alpacas, but they returned from the mission without having effected the object—they did not obtain a single animal. It had been attempted by other persons, but it was left to Mr. Ledger to achieve success; and although, perhaps, some of his (Mr. Gee's) animals might have been the first to land in the colony, still to Mr. Ledger was entirely due the merit of being the first successful introducer of this animal into Australia. It might be interesting to some to hear a few particulars of the way in which he (Mr. Gee) obtained possession of the flocks of alpacas with which his name was associated. Upon his return from Australia, about three years ago, he took it into his head to visit New York, and his arrival in that city was nearly contemporaneous with that of a flock of llamas, which had travelled a distance of about 4,000 miles on foot, having crossed the isthmus of Panama during the hottest weather. These animals were advertised for sale, having been previously exhibited at the Crystal Palace in New York. The poor animals, from the long distance they had travelled, were in a very bad condition at the time they were brought into the market. The proprietor of the flock, who was a Frenchman, had the modesty to ask £100 each for them; but at that time dollars were very scarce in New York, as it was during the monetary panic. They remained on hand till the winter, when they were put out to grass; and with reference to the question how far the animals would stand varieties of climate, he could say that he saw them nearly up to their backs in snow, with scarcely anything to eat, on Manhattan Island, where there was scarcely anything but stones. After having passed the winter in those most inhospitable quarters, the flock was advertised for sale in New York in the spring. He would read a short extract from the newspaper report of the sale:—

"The thirty-eight llamas that were imported into this city last Fall from Peru (or Chili), were offered at auction on Saturday, March 20, at the "Dyckman farm"—a farm of four or five hundred acres of land, in the City of New-York. It is situated on the Harlem River, below Kings Bridge. It is principally occupied as a grazing farm for bullocks "left over," or waiting for market at the great Bull's Head, in Forty-fourth-street—the proprietor of the sale-yards having leased it for that purpose. It was in consequence of this occupancy that the llamas were sent up there to winter, they having been taken when landed to the market-place yards for keeping and for sale.

"It seems as though a chain of misfortunes has attended the first attempt to introduce a breed of domestic animals into this country—discouraging, we fear, to all future efforts to add a new, and, we doubt not a profitable class, to our present stock. If we are not mistaken, the shipment was made from a Chilian port (we understand exportation of llamas is prohibited from Peru), by steamer to Panama, and consisted of seventy-two head. They were detained some three weeks at Panama, awaiting a vessel at Aspinwall for New York; and although in charge of a native shepherd, eigheen or twenty of the flock fell victims to Panama snakes, scorpions, poison herbage, and other Isthmus casualties, in the hottest part of the season. The remainder were then brought over in the cars, and shipped upon a brig too small to afford comfortable accommodation, with a bad provision of food, and therefore it is not a wonder that only forty-two of the number reached New-York alive. It is a wonder that all did not die, and that only four of the weakest lambs died after they were landed, since the whole of them were in such miserable plight that it was thought unwise to offer them for sale. They have, however, wintered better than a flock of sheep would if landed in the same condition, and all appear now very lively and healthy, notwithstanding their unwonted and long feeding upon dry forage; and, as an experiment, this has proved that these animals are easily wintered, in this latitude, and that they prefer the coarsest herbage, either green or dry. In Chili they are fed upon alfalfa, a very coarse kind of clover, and they might, if domesticated here, be fed the same, or on pea vines, bean stalks, buckwheat straws, or coarse weeds—such as our animals reject.

"If adopted into our family of domestic animals, the llamas must be kept principally for the fleece, just as sheep are, in some places, where mutton is not esteemed for food, since they would not be valuable as beasts of burden, except in very mountainous districts; and their flesh, although eaten in South America, is not esteemed by such of our countrymen as have tasted it. Lieut. Phelps says of it: "I have tried the flesh, and, although not partial to it, could live upon it if hard pushed." That observation was made of the animal in its wild state, called in Chili Guanico, but generally believed to be the original of the Peruvian llama, alpaca, or vicuna. The latter name is sometimes applied as the generic term of the race, and the other two names those of varieties, differing no more than varieties of sheep, the Alpacas being considerably smaller than the others, and more woolly; some of the variety called llamas are as tall as good sized yearling bovines.

In a wild state, the guanicos inhabit the chain of mountains from Tierra del Fuego to the Cordilleras in Peru, choosing their pasture ground just below the snow line. In a domestic state, the llamas are used as beasts of burden, in mountain or plain, in cold and heat, often traversing snowy altitudes and tropical valleys upon the same journey. They are much used in the Andes, by the miners, to bring down ore and carry up supplies; travelling twelve or fifteen miles a day with loads of 100 lbs. each, and living upon the coarsest and most scanty supply of herbage, and, like the camel, enduring days of toil without water. It is possible the llama, as well as the camel, may yet be used to advantage by travellers upon our great American deserts. It is stated in the history of Peru that troops of llamas, a thousand in number, used to be common, all bearing their loads, and travelling under the guidance of a few men over regions where no other beast could obtain a footing.

"One of the herd offered for sale on Saturday was exhibited loaded with packs, as he would be upon a journey. All of them, even a lamb of a few months old, are broken to the halter, and are very docile and tractable. Their countenances exhibit marked expressions of intelligence—the eyes are very bright and sight keen. The colour is generally that of brown or black sheep—some of them pretty nearly jet black. Some of the males are grey, or nearly white, with white faces. The shape of the head, face, ears and neck is like that of a native sheep, except the neck is more elongated. The cloven hoofs are larger and the legs longer than the tallest sheep, and the bodies though longer do not appear much larger than some of the tall varieties of sheep. The anatomy is curious in this, that the thigh seems to proceed from the hip joint with but little connection with the body.

"The fleece is from four to six inches long, fine and soft within, with coarse hairs thinly scattered through it and projecting beyond the mass. It very much resembles the fleece of a black sheep. We should judge the average weight of fleeces might be about ten pounds—the bellies being generally bare—and the value is greater than that of wool. The excellence and durability of alpaca cloth are generally known."

The report went on to say that the sale was not successful, the biddings never reaching the reserved price of 100 dollars each animal. He (Mr. Gee) subsequently bought the animals, and took them by the steamer, *City of New York*, to Glasgow, where they arrived shortly before the agricultural show in that city. He exhibited them at a charge of sixpence each, and had as many as 1,200 visitors. He afterwards brought them to Birmingham, at the time of the Queen's State visit, and although there

were about a million of people congregated on that occasion, not more than twenty-eight persons honoured his alpacas with a visit. The people seemed to have no idea what the animals were. Then he brought them to London in the hot weather of June. He sold three to Mr. Pattison, two to Miss Coutts, and ten to Mr. G. A. Lloyd, the latter at £25 each, which paid him very well; but they afterwards sold for £60 each. Mr. E. Wilson, the well-known editor of the *Melbourne Argus*, took the remainder of the flock for £700, which was at the rate of £23 per head. During the time the flock was in his possession, they grazed at Acton, about five miles from London, and they got quite fat. They started for Australia in high mettle, and, like most other emigrants, they did even better there. With regard to the acclimatisation of these animals, it could only be proved by time. In the case of the angora goat, which was introduced into Australia some years ago, a very beautiful fleece was produced when they got the real thing itself, but even amongst the goats brought from Turkey there was a white streak which spoiled its appearance, and the only doubt was, that the skins would run "kempy," and that in the course of a few generations the fleece would become as coarse as the hair of the common goat. He did not, however, think that would be the case with the alpaca, although the fleece had not the oiliness of the merino sheep, and from the nature of the food in Australia, he believed the wool would be improved in texture. With regard to the suitability of the climate there, and the supply of proper food for these animals, there could be no doubt. They might walk for hundreds of miles up to their knees in grass, which was excellent food, and the animals would eat it when it was in a dry state. At the time he bought his flock in New York, he was wholly ignorant of what was the proper food for them; but during the passage he fed them with Indian maize which they readily ate, as also hay, and they were in better condition after 13 days sea passage than when they were put on board. There was one point which he felt some delicacy in touching upon. He was glad to hear from Mr. Macarthur that Mr. Ledger was likely to reap some reward for his exertions; but with regard to himself, he was somewhat in the position of the Irish ostler who, when a gentleman was about to drive off without having handed him the customary gratuity, called after him, "Please yer honour, if my master asks me what you gave the ostler, what am I to tell him?" and if any one asked him what he had got, his reply would be—nothing.

Mr. Davis would be sorry to divert the discussion from the congratulatory tone which had characterised it, for it appeared they were a "Mutual Congratulation Society" that evening. One thing they might certainly congratulate themselves upon—that was upon the perseverance and energy which had pre-eminently distinguished our countryman, Mr. Ledger, in this matter. All who had taken any interest in affairs in Australia and South America, must be aware that the difficulties, dangers, and privations which Mr. Ledger had gone through, were such as few men would have the courage to undergo, even with the prospect of success in view. Yet whilst he tendered to Mr. Ledger the full measure of gratitude for what he had done, he could not look upon this matter from the *couleur de rose* point of view in which some regarded it. If they looked at the locality in which these animals originated—they lived in extremely mountainous regions, almost within the reach of perpetual snow. The vicuna lived in the highest regions of all. In Australia, they heard of snowy ranges, but those were mountains which were covered with snow only during certain portions of the year. Snow did not exist there over any great extent of country for any great length of time, and in such localities as it most existed, the country was rather barren and rocky. It was true these animals could live upon hard fare, but they could not live upon mere rocks. The snowy mountains of Australia were, to a great extent, of a rocky nature, and the quantity of grass was small. They had been told of the country explored by Mr. Stuart, but it should at the same time have been stated that it was a country of intense heat, and these were not animals to stand great heat, but were rather adapted for cold climates. No doubt they would live up to their bellies in snow, but he for one did not look forward with the hope that some did to the propagation of this animal in Australia. He would rather point to this subject as affording to enterprising young men in this country an opening to make their fortunes, by going to Peru and Bolivia and promoting the growth of wool there from the animal in its native climate. It might be said that South America was a badly governed country, but there were Englishmen making money there very fast. He quite approved of the course which had now been taken by the government of Australia. They were now disposed to do what they should have done in the first instance. They might now say to Mr. Ledger, "By your energy and perseverance you have proved yourself a benefactor to your country; here is the amount you have spent; take back your animals; increase and prosper. If you succeed, this country must benefit thereby, but in any case, it is no use for the government to turn sheep farmers." As to introducing these animals into England, he thought it would be unwise. At present they had animals which produced both wool and mutton, and to bring into a country like this, animals which produced fleeces only, would never answer. He was not afraid of this being attempted, for the very best reason with Englishmen—that it would not pay. They wanted an animal which gave them both clothes and food, and this they had in the sheep, from the Scotch sheep, which dwelt in the snows of the North, to the South Down, which flourished in the mildest climate and on the dryest lands. He could not sit down without expressing his deep obligation to Mr. Charles Ledger for what he had done, and all that he had contemplated doing for Australia. He regarded him as a great benefactor to that country if he did not succeed, but if he succeeded he would be an enormous benefactor both to Australia and his fellow-countrymen at home.

Dr. Crisp believed that there was an error as to the date at which these animals were first introduced into Europe. He understood it to be stated in the paper that it was not until the year 1815 that the llama was first introduced, but he believed it would be found that specimens of these animals were brought to the Jardin des Plantes, in Paris, as early as 1808. He begged to add his meed of praise to Mr. Ledger for the exertions he had made in this matter, and to the gentleman who had so ably brought this interesting subject before them.

The Chairman, in closing the discussion, thought the meeting would agree with him that, if there was one paper more than another which was particularly within the province of the Society, it was the one they had just heard. The subject of how to improve the cultivation and increase the production of so important a staple as wool, was one well worthy of their most attentive consideration. There was nothing in the paper of a speculative character. They had a collection of facts and details upon an important subject which might be turned to good account, if not at the present moment, certainly at some future time. It was their duty, as a Society, to give every encouragement to gentlemen who came before them with such valuable information as Mr. Ledger had collected—not in the ordinary sense of the term, but received directly from his brother, who had devoted so many years of his life to the promotion of this object. His friend on the left (Mr. Davis), had characterised the meeting as one of mutual congratulation. He (the Chairman) thought it was justly so. At the same time, his friend had advanced opinions somewhat at variance with those expressed in the paper. That was one true object of discussion. They did not ask gentlemen to approve of everything that was said. They always invited discussion upon what was advanced in the paper, and the greater the variety of opinion that was elicited

the more valuable the meetings of the Society became. They had heard a very remarkable fact that evening, which showed how important a part the commerce of this country played in the industry of the world. Englishmen, in the first instance, had been the means of introducing the animal spoken of from South America into Australia, and then they afforded the best market to which the commodity produced could be sent. That was a noteworthy instance of the influence of British commerce all over the world. He was sure they would all feel indebted to the gentleman who had brought such a collection of facts before them in so clear a manner as had been done that evening, and that they would cordially concur in a vote of thanks to Mr. Ledger for his paper.

The vote of thanks having been passed,

Mr. Ledger, in reply on the discussion, said he had studiously avoided introducing into this subject matters of a purely personal or pecuniary character; he had not spoken of the dangers and difficulties his brother had undergone more than was essential to the proper elucidation of the subject, but as remuneration had been alluded to, he fully concurred in the hope that his brother would ultimately reap a large reward for the accomplishment of his enterprise. This depended entirely, however, upon the success of the animals. He had heard (not from his brother), that at Copiapo, £42,000 had been offered for the flock for the French Government, and declined. He thought the New South Wales Government had acted with forethought and generosity in giving his brother £15,000, every farthing of which, however, had been remitted to South America, to liquidate liabilities incurred in the prosecution of the enterprise, leaving a balance still due of £1,080, and he was happy to say his brother had concluded an arrangement with the Colonial Government, which was waiting the sanction of the legislature, to pay him cash £2,000, and £3,000, in annual payments of £500 for six years, to provide him pasture grounds free of rent or taxes for 12 years; at the expiration of which the animals were to be his property on payment of the principal of £20,000 without interest. The produce of wool in the 12 years to be his, but he was not to be permitted to sell any of the animals without the consent of the Colonial Government.

The paper was illustrated by a collection of alpaca skins, contributed by Mr. Murrietta; vicuna skins, by Mr. Skinner Row; specimens of alpaca wool, by Mr. Gee; of llama wool, by Miss Burdett Coutts; and pieces of alpaca fabric by Messrs. Edwards. Coloured diagrams of all the various animals, by Mr. H. D. Bell, were on the walls. To all these persons the thanks of the Society are due.

The Secretary announced that on Wednesday evening next, the 27th inst., a paper "On the Hudson's Bay Territories, their Trade, Productions, and Resources," by Mr. A. K. Isbister, would be read.

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS.

(*Continued from page 198.*)

Honduras.—The republic of Honduras exhibits every species of variety in point of physical construction and aspect of its territory, abounding in ranges and clusters of lofty mountains, elevated table lands, densely wooded valleys of rich alluvial soil, watered by many large streams, taking their rise at the base of the principal chain of Cordilleras, which traverse the country from east to west, and flowing into the two oceans; and the whole affording as great a diversity of soil, climate, and vegetation as can be found in any other region of the world of equal or greater limits. The department of Comayagua owes its importance to the capital of the State being comprised in it. It lies in the very centre of Honduras, and is very rich in minerals; but at present very few mines are worked within its limits. The population is 50,000 inhabitants, the greater part of whom are concentrated in the large valley of the same name; the soil is very fertile, but agriculture is at a very low ebb. Its products are maize, wheat, sugar-cane, plantains, beans, and a few other vegetables. Such is the improvidence and indolence of the people that, notwithstanding the adaptability of the soil for cultivating the above and many other products, sufficient for sustaining many times the present number of people, they very seldom raise sufficient products to last till harvest time in the ensuing year, and consequently a degree of scarcity, amounting almost to a famine, is generally experienced between April and August, when the crops are reaped. The scarcity of this year is unprecedented, owing to the war which raged during the last, which effectually stopped all agriculture; the maize, the principal article of food, and which in ordinary times is sold at three dollars the fanega, is now commanding prices ranging from 30 to 36 dollars. The number of people who are devoted to agriculture and farming in this department does not exceed 5,000; the other avocations of life are those of the trader, shopkeeper, and artisan, while by far the greatest part of the inhabitants have no recognised way of supporting themselves, and their necessities indeed are so few, that little is needed to satisfy them. The same observation is, in fact, applicable to the whole State. The city of Comayagua has a population of about 6,000 inhabitants. It contained about 18,000 in the year 1827, when it was taken, pillaged, and a portion of it set fire to by the troops of Guatemala, and has never been able to recover from the effects of this disaster. The department comprehends 14 districts, 33 villages, and 9 hamlets. The department of Tequagalpa, situated on the east of Comayagua is, perhaps, the richest section as regards mineral substances, and by far the greatest part of the silver exported from Honduras is raised in the mines of this department. Its capital, which bears the same name, is the most populous and prosperous town in the state, containing upwards of 10,000 inhabitants. It stands on the right bank of the river Choluteca, and is connected with the small Indian village of Comayaguela by a handsome stone and mortar bridge of 9 arches. It has 6 churches, an incipient university, and the mint for the copper or provisional money. The department comprises 13 districts, 19 villages, and 11 hamlets, with a population of 55,000 souls. The department of Gracias lies between that of Comayagua and the Republic of Guatemala. Its population is the largest in the state, numbering at least 65,000 souls and with the exception of Olancho, is the wealthiest department. The inhabitants are more industrious and in better circumstances than in the other divisions. A great number of them employ themselves in growing tobacco, which is the staple commodity of the department. Indigo is also cultivated here, although as yet to a small extent. All the opals exported from Honduras are extracted from the mines of Gracias, where some very rich silver ores are also to be found. There are two towns, the one is Gracias, the capital, and the other Santa Rosa, each having a population of about 3,000 inhabitants. There are 11 districts, 40 villages, and 21 hamlets.

Olancho is more a pastoral than an agricultural department, and contains extensive savannas of excellent pasture ground, on which graze innumerable herds of horned cattle, which constitute the principal wealth of the inhabitants. The people being scattered in *haciendas*, or large cattle farms, the number of villages and hamlets, which amount in all to 14, is very small relatively to the population, numbering about 52,000 inhabitants. The capital, Juticalpa, is reckoned to be only second to Tequagalpa, in point of population, and is supposed to contain

8,000 souls. There is another town called Danli, which has about 4,000 people; the number of districts is 9.

Olancho has some very rich mines, some of them of gold, but this metal chiefly occurs in the beds of the rivers, all of which carry gold of the purest quality in their sand; yet, strange as it may appear, very few of the inhabitants employ themselves in gold washing, their chief occupation being that of breeding and tending cattle. This department is the wealthiest of Honduras, and some of the largest capitals in Central America are to be found here, a circumstance attributable to the comparative quiet which has peen enjoyed from the greater distance to the centres of strife and commotion. But while the inhabitants have advanced materially in wealth, they have remained stationary in a moral and intellectual point of view, and nowhere is education in such a backward state as here.

Choluteca is situated on the southern part of Honduras, fronting the Bay of Fonseca, and consequently the islands situated in this bay fall under its jurisdiction. The population does not exceed 20,000 inhabitants, of which the town of Nacaome may contain 5,000, and that of Choluteca, the capital, some 2,000. The former town is the most important one in the department, and as regards commerce, Nacaome is one of the first places in the state, from its proximity (two or three miles) to the port of La Brea, where most of the goods that come *viâ* the Pacific are landed. The chief wealth of the inhabitants consists, at present, of cattle; but there are several rich silver mines, only two or three of which, however, are now being worked. Besides the two above-named towns, it has the port of Amapala, with 1,000 inhabitants, and in all 7 districts, 6 villages, and 5 hamlets.

Santa Barbara is situated on the north of Comayagua, and is traversed by the rivers Chamelicon, Blanco, Santiago, and Ullua. It is in the valleys of these rivers that the mahogany "cortes" or cuttings are established. Santa Barbara abounds in rich woodlands, producing all the precious woods which grow between the tropics; a portion of the inhabitants consequently are devoted to mahogany felling; but still cattle constitutes, as in Blanco, the chief source of wealth. The Indians collect sarsaparilla, vanilla, dye-woods, skins, and gums, which they exchange for European manufactured articles of small value. The department contains 7 districts, 22 villages, and 3 hamlets, with a population of 42,000 souls, of which 2,000 belong to the town of Santa Barbara, the capital, and about 3,000 to that of Omoa, the principal port of Honduras.

The department of Yoro, while it is the largest in territory, is the least peopled, and the number of inhabitants does not exceed 18,000. It abounds in mahogany to a greater extent than any other part of the state, and by far the greatest number of cuttings are established here. There are also large cattle haciendas, and herds, which enter largely into the composition of its wealth and resources. As in Santa Barbara, the Indians employ themselves in collecting sarsaparilla, skins, vanilla, and gums, for the same purposes of exchange. The capital is Yoro, and has about 2,000 people. The department comprises 14 districts, the port of Truxillo, 6 villages, and 2 hamlets.

Home Correspondence.

NON-ACTION OF SOFTENED CHALK SPRING-WATER UPON LEAD.

Sir,—Observing a renewal, on the occasion of the paper on the present condition of the water supply of London, of the often repeated, but never truly made statement, that softened chalk spring-water acts upon lead in consequence of the water being softened, I beg leave to say, that in repeated trials of chalk spring-waters, softened and unsoftened, I never once found this to be the case. It may suffice to state generally the result of the last considerable investigation on this point that I had occasion to make, which was on chalk spring-waters in the neighbourhood of Maidstone. I exposed a gallon of the several waters to 50 square inches of scraped bright lead for a week. Such circumstances of exposure would produce much more action than what would occur in the practice of water supply. I found that the action of the softened water, when the spring had been kept free from contamination, lay between one 400th and one 800th of a grain per gallon; in one case, where previous contamination was traced, the action was one 200th of a grain. These inconsiderable and perfectly harmless amounts of action I found to be between 4 and 6 per cent. of the action of the same waters previous to their being softened.

I am, &c.,
THOS. CLARK, M.D.,
Late Professor of Chemistry in Marischal College and University, Aberdeen.

19th February, 1861.

UNIFORM WEIGHTS AND MEASURES.

Sir,—I shall be obliged by the insertion in your *Journal* of the following short statement from the German newspapers. It shows the progress of the metric system in Germany, and contains some suggestions which may be useful in the extension of the same system among us.

I am, &c., JAMES YATES.

Highgate, Feb 14, 1861.

COMMISSION FOR ESTABLISHING UNIFORM MEASURES AND WEIGHTS IN GERMANY.

The following is extracted from the *Neue Frankfurter Zeitung* for January 25th:—

This Commission has recently made a great advance towards the attainment of its object, all the more essential determinations having been adopted with perfect unanimity. Not only is the metre to be taken as the unit of linear measure, but that well-known name is to be retained in preference to the German monosyllable *stab*, meaning staff, which had been recommended in a memoir published under the authority of the Hanoverian Government.

The fundamental decimal division of the metre into ten decimetres, 100 centimetres, and 1,000 millimetres, will receive some modifications, which seem judicious, and adapted to be useful. The decimetre is considered to be of less practical importance than the centimetre or the millimetre. It is therefore proposed that, passing by the decimetre, the centimetre should be called—in the affairs of common life—*cent*, and the millimetre—*mil*. It is expected that both the long and the abbreviated names will be learnt by all who are well instructed in the matter, although the short names will be commonly used by working people.

Besides this division into centimetres, or mils, a binary division will be admitted for cloth-measure. As the German ell is divided into its half, quarter, eighth, and sixteenth, the metre will be divided in the same way, not merely in compliance with long-established habit, but because these divisions are convenient in the case of articles which admit of being doubled several times. These binary divisions will be marked on one side of the scale, and the lowest of them will be a little longer that the English nail.

The double metre will be the fathom, to be used by mariners, and is, indeed, already so used in Saxony.

For itinerary measure it is proposed to use the kilometre, a rod of five metres, and a mile of 7,500, which would not differ materially from the common German mile.

Taking the square metre as the unit of superficial measure, the following will come into use:—

The square rod	... equal to	25	square metres.
The are	,,	100	,,
The acre (morgen)...	,,	2,500	,,
The yoke	,,	5,000	,,
The hectare	,,	10,000	,,

It is intended that the different German States should select from these measures, and use any of them (more or less) accord-

ing as they may be best suited to the previous habits of various districts. All of them conform to the metric system.

Lastly, the cubic metre is to be the unit for solids, with adjustments for measuring fire-wood, timber, masons and bricklayers' work, road materials, engineering, &c.

This proposal is to be laid before the Diet, at Frankfort, for adoption, in May next.

N.B.—The weights of the metric system are in use throughout Germany already.

VENTILATION OF MINES.

Sir,—The importance of the subject is a sufficient excuse for my asking the favour of a place in your columns for the following suggestions on the ventilation of coal mines.

Scarcely a week but we have accounts of some dreadful explosion in one of these mines, and then the usual formalities are gone through and the matter is forgotten. We pity the men; we raise subscriptions for the widows and children; and this, month after month.

Let it be admitted that the obtaining of coal is a dangerous employment, it still becomes a duty to make it as little dangerous as possible.

Some years ago I went down a mine, for the purpose of seeing the mode of working the coal, and found the system of ventilation to be that usually known. The air was rarefied by a large fire under one shaft and, rising, its place was supplied by fresh air, which, descending the other, and carried by brattices and partitions through the whole mine, at last reached this, the up-cast shaft.

Nothing can be better for all general purposes of ventilation than this system if well carried out; sufficient air is supplied to enable the workmen to breathe and to remove, in a very diluted state, any small portions of escaped gas that may be in the working; but suppose a fiery place in the seam to be discovered, it then becomes necessary to use the " Davy " lamp, as the miners call it, for the air and gas are in explosive proportions, and the least accident to this lamp may fire the mine.

Now the usual remedy in a case of this kind is but increased ventilation, to secure such a dilution as to render the mixture non-explosive. That this is a failure, let the reports in our daily papers witness.

The question remains—is there any better and safer means of preventing the mischief arising from the accumulation and issue of gas? I think there is.

The gas either "oozes" or "blows"—"oozes" from the small crevices, or "blows" with considerable force from the larger; but whether it "oozes" or "blows" it invariably ascends, though mixing with the air as it rises in proportions, greater or less, according to the force of its issue, it still must ascend, and hence the most explosive mixture is almost always at the ceiling of the working, along which it spreads, growing more and more diluted at every foot of its course. The plan I have to propose is one that takes advantage of this difference of specific gravity between the air and the gas. I propose a system of gas drainage for the mine. Let a pipe of sufficient diameter be carried down the up-cast shaft, with branches of diminished calibre (fastened to the roof) carried to all parts of the workings likely to produce gas. Let an upward current be created in this pipe, by means of a revolving fan, of sufficient force to cause a thorough draft through the whole series of branches; let the ends of the pipes in the various stalls or places where the workmen labour, be fitted with a flattened cone, the mouth of which should touch the roof of the stall; in addition let there be a simple valve arrangement, for shutting off the inward current in the event of its not being required for the safety of that particular place. It is evident that in this system we have the elements of perfect safety; the ordinary issue of gas is taken from the mine immediately on its appearance, while in the event of a pick discovering "a blower" the conical cap might be placed so near it by the addition of another foot or two of tube, that that also could be carried out in the same way.

The very minor question of what to do with the mixed gas and air that issues through the fan is safely left to others; whether to distribute it through the air by a high chimney, or use it as a means of heating the boilers of the engine driving the fan, are questions of the spot; but the main question—that of removing the gas as rapidly and effectually as possible, as soon as given out—would, I think, be answered by the adoption of this plan. If this be true, it follows that, at the cost of a few hundred pounds, every mine in the kingdom might be rendered safe, without the slightest interference with its present arrangements for ventilation or carrying.

If it be not true—if the plan be false in theory and impossible of practice, I shall at least have the consolation of feeling that it has reduced the space in which the true theory and practice are to be found, and has thus—though false in itself—aided the discovery of truth where a true theory and an efficient practice are matters of life and death to thousands.—I am, &c.

A. STEWART HARRISON.

133, Upper Thames-street, E.C.

EXHIBITION OF 1862.

Sir,—The remarks of Mr. Hanbury, published in your *Journal* some short time since, on the arrangement and general care of the drug collection which will probably figure at the forthcoming Exhibition of 1862, are equally applicable to other collections. To any one acquainted with those of 1851 and 1855, the deficiencies must be notoriously apparent. For instance, the large collection of woods of 1851 would have been greatly enhanced in value had they been properly named, or, (considering the difficulty of identifying species in remote countries) still better, had specimens of the leaves and flowers accompanied each section. It would then have been easy to determine to which family the plant belonged, and whether, judging from its affinities, it was likely to prove valuable. This could be easily done by numbering the wood and specimen to correspond, the former with a brand or an indelible paint. Very many fine sections of wood that were exhibited in the Exhibition of 1851, which must have cost great labour and trouble to procure, were quite valueless for want of information as to the species producing them, and in many cases their country; some having no other mark than an unintelligible sign, resembling some complicated trade mark, or in other cases a confusion of figures. The same jumble was observed in many other collections besides woods. Resins, gums, medicinal substances, and dye stuffs, all helped, at the close of the Exhibition, to swell the list of the unknown. Some of this was no doubt due to the displacement of labels, numbers, &c., as sometimes on referring to the number of an object in the list or catalogue belonging to it, the description attached to that particular number is evidently intended for something else, not at all agreeing with the object you are in search of, clearly indicating that the mistake was in the numbering. Now this might be obviated in a great measure, if the specimens are dry, and contained in bottles or jars, by placing inside a label or number, corresponding with one on the outside, so that if the outside one got lost or misplaced, there would still be one to identify it with in the list. Again, if the specimens are preserved in acid or spirits, a number might be attached inside, stamped in some metal which the liquid would not act upon. Great care should be taken to keep all specimens free from insects or damp. Woods might be effectually protected by washing with turpentine or corrosive sublimate, and some camphor might be packed up with all the dried specimens.

It is to be hoped that our contributors abroad will take a timely hint in placing the resources of their country in the most favourable light, so that they may receive the attention they merit, while at the same time they may prove beneficial to science and art in this country, and

encourage communication with countries as yet but little known in our commercial circles.

I am, &c.,

JOHN R. JACKSON, CURATOR.

Royal Gardens, Kew, W., February 19, 1861.

To Correspondents.

ERRATUM.—In last number of *Journal*, page 202, col. 2, line 37, for "nominal," read "normal."

MEETINGS FOR THE ENSUING WEEK.

MON. ...Royal Geographical, Burlington House, 8½.
Actuaries, 7.
Medical, 8½.
TUES. ...Inst. of Civil Engineers, 8.
Medical and Chirurgical, 8½.
Zoological, 9.
WED. ...Archæological Assoc., 8½.
R. S. Literature, 4½.
Society of Arts, 8. Mr. A. K. Isbister, "On the Hudson's Bay Territories; their Trade, Productions, and Resources."
THURS...Institution of Naval Architects, 12. 1. Mr. J. D'A. Samuda, "On the Construction of Iron Vessels of War, iron cased." 2. Mr. J. Scott Russell, "On the Professional Problem presented to Naval Architects in the Construction of Iron-cased Vessels." 3. Mr. Charles Lungley, "On the new Mode of Constructing Shot-proof Vessels of War."
Evening Meeting, 7. "Discussion on Iron-cased Vessels of War."
Royal, 8½.
Antiquaries, 8½.
Philological, 8.
Royal Society Club, 6.
FRI. ......Institution of Naval Architects, 12. 1. Rev. J. Woolley, "On the Rolling of Ships." 2. Mr. S. Read, "On a Method of Calculating the Hydrostatic Stability of Ships." 3. Mr. F. K. Barnes, "On a new Method of Calculating the Stability of Ships." 4. Mr. J. Scott Russell, "Notice of the late Mr. John Wood, and of Mr. Charles Wood, Naval Architects."
Evening Meeting, 7. 1. Mr. F. J. O. Evans, R.N., "On the Deviation of the Compass in Iron and other Vessels, considered practically with reference to Material, Position, and Mode of Construction and Equipment." 2. Mr. Norman S. Russell, "On American River Steamers."
Archæological, 4.
Royal Inst., 3.
SAT. .....Institution of Naval Architects, 12. 1. Mr. J. Scott Russell, "On the Wave Line Principle of Ship Construction." Part III. Conclusion. 2. Mr. J. Grantham, "On the Classification of Iron Ships." 3. Mr. Charles Lungley, "On the Construction of Unsinkable Iron Ships."
Medical and Chirurgical, 8½.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered during the Vacation, 1860.

Par. Num.
562. Sailors' Homes—Abstract of Return.
574. East India (Claims upon Oudh)—Return.
84 (7). Trade and Navigation Accounts (31 July, 1860.)
504. South Kensington Museum—Report from Committee.
553. The Bell (New Palace, Westminster)—Copy of Reports.
540. Burials—Returns.
577. National Gallery (Captain Fowkes' Plan for Alteration—Return.
564. Audit of Accounts (Exchequer)—Return.
566. East India (Civil Engineers' Examinations)—Returns.
578. Statute Book—Return.
579. East India (Bombay Light Cavalry)—Return.
512. Poor Removal—Return.
573. East India (Imports)—Return.
580. Unclaimed Dividends, &c. (Ireland)—Return.
590. Ribbons—Return.
494. Thames Embankment—Report and Evidence.
383 (A 3). Poor Rates and Pauperism—Return (A).
682. Naval Prize Money, &c.—Account.
575. Redundant List (Public Departments)—Abstract of Returns.
603. East India (Army)—Return.
480. Transport Service—Report and Evidence.
236 (2). Elections (Ireland)—Return of the Total Cost in 1857 and 1859.
440. Civil Service Appointments—Report and Evidence.
556. Metropolitan Board of Works—Account of Receipt and Expenditure.
556. do. do. —Report.
569. Colonial Governors, &c.—Return.
572. Inhabited House Duty, &c.—Returns.
576. Westminster Bridge, &c.—Return.
580. Poor Law Board (Payment of Debts)—Return.
604. East India (Guaranteed Companies)—Return.
607. Fines and Penalties (Ireland)—Abstract of Accounts.
612. East India (Bombay)—Copies of Letters.
614. Mr. Drought—Report, &c.
615. Turnpike Trusts—Return.
618. Superior Courts of Law (Fee Fund)—Statement.
545. Navy (Gun and Mortar Boats)—Report and Evidence.
84 (8). Trade and Navigation Accounts (31st August, 1860).
205. Country Treasurers—Abstract of Accounts.
383 (A 4). Poor Rates and Pauperism—Return (A).
525. Friendly Societies—Report of the Registrar.
554. Queen's Colleges (Ireland)—Return.
581. Poor Rate Assessments—Return.
586. Standing Orders of the House of Commons.
605. East India (Income and Licence Bills)—Return.
641. Navy and Army—Detailed Accounts of Receipts and Expenditure.
544. Breakwaters and Harbours—Lords' Report.
587. Woods and Forests—Return.
613. Archdeaconries.—Return.
421. Woods, Forests, &c.—38th Report of the Commissioners.
609. China—Return.
530. Merchant Shipping—Report and Evidence.
84 (9). Trade and Navigation Accounts (30th Sept. 1860).
611. Army (Berrington and Spiller's Knapsacks)—Copies of the Reports.
565. Railways—Return.
610. Surveys—Return.
383 (A 5). Poor Rates and Pauperism—Return (A).
599. Imperial Guarantees—Return.
520. Irremovable Poor—Report and Evidence.
593. Newspapers, &c.—Return.
568. Quarantine—Abstract of Regulations in force in Foreign Countries.
568 (1). Quarantine—Returns obtained by the Board of Trade.
589. Intoxicating Liquors (Scotland)—Return.
512 (1). Poor Removal—Return.
383 (B). Poor Rates and Pauperism—Return (B).
84 (10). Trade and Navigation Accounts (31 Oct. 1860.)
608. Army (Staff Officers)—Return.
441 (1). Military Organisations—Index to the Report.
540 (1). British Museum—Index to the Report.
584. Savings Banks—Return.
561. Spirits, &c.—Returns.
594. Post Office (Scotland)—Return.
383 (A 6). Poor Rates and Pauperism—Return (A).
691. Poor Law—Return.
84 (11). Trade and Navigation Accounts (30 Nov. 1860.)
483 (1) Miscellaneous Expenditure—Index to the Report.
596. Natal—Return.
606. Emigration (North American Colonies)—Return.
383 (A 7). Poor Rates and Pauperism—Return (A).
616. Jamaica (The Vere Case)—Return.
600. St. Lucia—Return.
597. Electric Telegraph Companies—Return.
383 (C). Poor Rates and Pauperism—Return (C).
431 (1). Packet and Telegraph Contracts—Index to the Reports.
504 (1). South Kensington Museum—Index to Report.
383 (A 8). Poor Rates and Pauperism—Return (A).

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, February* 15*th*, 1861.]

Dated 15*th October*, 1860.

2514. P. R. Smith, Essex-street, Strand—Imp. in fire-arms and ordnance, and in the projectiles to be used therewith.

Dated 11*th December*, 1860.

3037. J. Hamerton, Shibden, near Halifax, Yorkshire—Imp. in manufacturing certain textile fabrics, known as "zebra cloth" or triple cloth.

Dated 12*th December*, 1860.

3051. G. S. Sharwood, Bradford—Improved machinery for drying, stretching, and tentering woollen or other cloths. (A com.)

Dated 17*th December*, 1860.

3093. J. W. Hill, 3, Philadelphia-place, Hackney-road, Middlesex—Imp. in sewing machines and the use thereof.

Dated 5*th January*, 1861.

36. W. M. Williams, Handsworth, Staffordshire—An imp. or imps. in treating coal and other bituminous minerals and peat, for the purpose of obtaining solid and liquid hydro-carbons therefrom.

Dated 15th January, 1861.

112. C. Stevens, 31, Charing-cross—A new paste made from wood to be used in the manufacture of various articles, together with the apparatus employed in the preparation of the same. (A com.)

Dated 19th January, 1861.

154. D. Mann, Rochester, New York—Imp. in rotary spading and digging machines.

Dated 24th January, 1861.

198. J. Vero, Atherstone, Warwickshire—Imp. in machinery for separating the fur or hair from the skins of animals.

Dated 25th January, 1861.

203. J. Law, Hollinwood, Lancashire—Imp. in shutting off the steam and operating upon the breaks of engines employed in lowering into and lifting from mines or pits.
204. B. Lauth, Pittsburgh, Pennsylvania, U.S.—Imp. in piling iron for heating, preparatory to re-rolling or hammering the same.

Dated 28th January, 1861.

218. J. Boulby, Whitby, Yorkshire—An improved log or instrument for measuring the speed of ships and the velocity of streams of water.
220. J. Badcock, Canhall-gate, Wanstead, Essex—Imp. in signalling between the different carriages of railway trains and other engines.
222. F. H. Twilley and A. Romer, Dean-street, Middlesex—Imp. in tobacco-pouches, purses, and other such like receptacles.
224. W. E. Newton, 66, Chancery-lane—Improved apparatus for exhausting and compressing air, and producing air blasts. (A com.)
226. W. E. Newton, 66, Chancery-lane—Imp. in railway carriage wheels. (A com.)
228. J. A. Shipton, Wolverhampton—Imp. in steam engines.

Dated 29th January, 1861.

234. J. W. Friend, Freemantle, Southampton—Imp. in beer engines
238. E. A. L. Negretti and J. W. Zambra, Hatton-garden—Imp. in mountain and other barometers.

Dated 30th January, 1861.

240. A. Courtois, and J. E. de Soulange, Paris—An improved construction of kiln for calcinating limestone, gypsum, or other similar substances.
242. J. Mellor, jun., Colne-cottages, Kings-bridge, Huddersfield—An improved machine called a "Cross raising gig," used in the dressing of woollen cloth.
244. A. Boyle, Birmingham—Imp. in the manufacture of umbrellas and parasols.
246. F. Smith, Carlisle-street, Middlesex—An imp. in the manufacture of swivel rings especially applicable to swivels and watch keys.
248. G. T. Bousfield, Loughborough-park, Brixton—Imp. in the manufacture of lasts for boots and shoes. (A com.)
250. G. T. Bousfield, Loughborough-park, Brixton—Imp. in the manufacture of boots and shoes. (A com.)
252. J. H. Johnson, 47, Lincoln's inn-fields—Imp. in the treatment of vegetable substances, and in the preparation of beverages therefrom. (A com.)
254. R. B. Longridge, Manchester—Imp. in promoting the circulation of water in steam boilers, and in supplying water to steam boilers.

Dated 31st January, 1861.

256. C. Reeves, Birmingham—A new or improved instrument or apparatus for converting breech-loading small arms into muzzle-loading small arms, and an imp. or imps. in cartridges for breech-loading arms.
257. R. D. Clegg, 73, Fleet-street—Imp. in timekeepers, called "Atmospheric clocks, or mercurial timekeepers.
258. J. Robertson, Avon Bank, Lanark, N.B.—Imp. in machinery or apparatus for finishing textile fabrics.
259. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in machinery or apparatus for roasting coffee and other seeds and roots, and for drying grain. (A com.)
260. S. Moulton, Bradford—Imp. in the construction of cables for telegraphic purposes.
261. S. W. Warren, Brooklyn, New York—An improved high and low water indicator for steam and other boilers.
263. J. Chatterton, Highbury, Middlesex—Imp. in treating gutta percha, india rubber, and compounds containing one or both of these substances, and in machinery and apparatus employed therein.

Dated 1st February, 1861.

267. H. Curtiss, 7a, Skinner-street, Snow-hill—Imp. in men's scarfs, cravats, and neck-ties.
269. A. Crichton, Cork—Imp. in applying and fitting screw propellers, and in forming and fitting the stern parts of ships for receiving screws.
271. J. J. de Arrietta, Piccadilly—Certain applications of chapapote and its products, and of the same combined with other substances, and of materials treated therewith, to various purposes in manufactures and the useful arts.
272. A. V. Newton, 66, Chancery lane—An improved construction of motive power engine. (A com.)
273. H. Medlock, 20, Great Marlborough-street, Westminster—Imp. in brewing malt liquors.
274. M. Pollok, jun., Govan, Lanark, N.B.—Imp. in machinery or apparatus for winding yarn or thread.
275. H. Bessemer, Queen-street-place, New Cannon-street—Imp. in the manufacture of malleable iron and steel, and in the manufacture and apparatus employed in such manufacture.
276. T. E. Knightley, 25, Cannon-street—Imp. in constructing stable floors.

Dated 2nd February, 1861.

277. G. H. Spencer and R. G. Cook, Hathersage, Derbyshire—Imp. in umbrella and parasol furniture, and in the means or apparatus employed in treating umbrella and parasol furniture, parts of which are also applicable in heating steel wire ribs, rods, or tubes for other purposes.
278. E. T. Hughes, 123, Chancery-lane—Imp. in the manufacture of woven fabrics, and in the machinery employed therein. (A com.)
279. W. Prangley, Salisbury—Imp. in pianofortes.
280. J. Cameron, Hindpool, Lancashire—Imp. in purifying water for the supply of steam boiler and other uses.
281. A. L. Bricknell, Loughborough-park, Brixton—Imp. in fire escapes.
282. W. Clark, 53, Chancery-lane—Imp. in the manufacture of paper pulp. (A com.)
283. W. Clark, 53, Chancery-lane—Imp. in bellows. (A com.)
285. W. N. Wilson, 144, High Holborn, and W. T. Rowlett, Leicester—Imp. in sewing machines and in apparatus connected therewith.
286. J. G. Marshall, Headingley, Leeds—Imp. in the treatment of flax, hemp, and other fibres in various stages of preparation and manufacture.

Dated 4th February, 1861.

289. J. Abraham, Birmingham—An imp. or imps. in brass nails to be used in sheathing ships, and for other purposes.
290. A. F. C. de Balyon, Paris, 57, Faubourg Montmartre—Imp. in the manufacture of woven fabrics.
291. R. Howarth, Mount Pleasant, Bury, New-road, Manchester—Imp. in machinery for raising pile on woollen, cotton, and other fabrics.
292. E. C. Morgan, Norwich—Imp. in carriage building.
293. R. A. Brooman, 166, Fleet street—Imp. in carving or figuring wood. (A com.)
294. J. Murray, Whitehall-place—Imp. in railway carriages.

Patents Sealed.

[*From Gazette, February 15th*, 1861.]

February 15th.

2038. A. Halter and F. Decorce.
2043. F. P. J. V. den Ouwelant.
2044. W. Clark.
2059. W. Clark.
2311. J. H. Wells.
2331. R. Geoghegan.

[*From Gazette, February 19th*, 1861.]

February 19th.

1892. J. Hunter.
2014. C. E. Wilson and H. G. Hacker.
2018. R. West.
2026. R. J. Cole.
2028. S. Purchas.
2030. Sir J. S. Lillie.
2034. R. R. Bealey.
2035. W. E. Gedge.
2039. S. Greenwood.
2945. J. J. Révy.
2058. M. A. F. Mennons.
2117. W. Johnston and W. Ross.
2123. W. H. Muntz.
2136. H. Potter.
2156. A. Lester.
2171. E. Weiskopf.
2192. M. A. F. Mennons.
2218. F. A. Calvert.
2276. F. A. Calvert.
2308. W. E. Newton.
2450. G. W. Reynolds and E. Dance.
2488. T. Wilson.
3007. J. H. Cary.
3017. D. Annan.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, February 15th*, 1861.]

February 11th.

259. C. Johnson & G. Johnson.
274. J. Macintosh.

February 12th.

276. J. E. Ryffel.
301. G. Baker and J. E. Baker.

[*From Gazette, February 19th*, 1861.]

February 14th.

291. J. Garnett.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, February 15th*, 1861.]

February 13th.

393. E. Loysell.

[*From Gazette, February 19th*, 1861.]

February 16th.

431. J. Boydell.

Journal of the Society of Arts.

FRIDAY, MARCH 1, 1861.

INTERNATIONAL EXHIBITION OF 1862.—GUARANTEE DEED.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors will make it convenient to call there and attach their signatures to the Document.

GUARANTEE FUND FOR THE EXHIBITION OF 1862.

The following additions have been made since the last announcement in the *Journal* for February 25:—

*** *The name marked with an asterisk is that of a Member of the Society of Arts.*

NAME.	AMOUNT.	REPRESENTING THE OBJECTS OF THE SOCIETY—ARTS, MANUFACTURES, AND COMMERCE.
Amount last announced	£372,400	
Lord Taunton, 27, Belgrave-square, S.W.	1,000	Arts.
The Duke of Buccleugh, K.G., Bowhill, Selkirk	5,000	Arts.
Henry Thring, 16, Duke-street, Westminster, S.W.	100	Arts.
*Parkins and Gotto, Oxford-street, W.	1,000	Commerce.
Charles Lucas (Lucas Brothers) Belvedere-road, Lambeth, S.	1,500	Commerce.
Thomas Lucas (Lucas Brothers) ,, ,, ...	1,500	Commerce.
Thomas Chappell, Bond-street, W.	500	Commerce.
Total	£383,000	

By Order, P. LE NEVE FOSTER, *Secretary.*

EXHIBITION OF 1862.—CHARTER.

The following is a short statement of the leading points in the Charter granted by her Majesty to the Commissioners, and published in last week's *Journal*:—

The Charter, dated the 14th of February, 1861, after reciting the prayer of the Society of Arts, incorporates Earl Granville, K.G., the Marquis of Chandos, Thomas Baring, M.P., Charles Wentworth Dilke, the younger, and Thomas Fairbairn, by the name of "The Commissioners for the Exhibition of 1862," for the purpose of managing the International Exhibition of the Products of Industryand Art of all Nations, in 1862. The Commissioners have power to borrow money for the purposes of the undertaking (the Bank of England having already arranged to lend £250,000), and are authorised to make arrangements with the Commissioners for the Exhibition of 1851 for holding the Exhibition on a portion of the estate of those Commissioners at Kensington Gore, in accordance with the arrangements made with them by the Society of Arts; a sum not exceeding £50,000 to be expended on buildings of a permanent character, adapted for the purposes for which the Society of Arts may require to have a lease of them, under the arrangements now made between the Society and the Commissioners for the Exhibition of 1851, such buildings to stand on a site not exceeding one acre. And the Commissioners are empowered to erect, and to remove, or leave standing at the close of the Exhibition, any building erected for the same; and to distribute prizes to exhibitors, receive money for entrance to the Exhibition, and dispose of such money for the purposes of the Exhibition, and, generally to do everything necessary for promoting the ends and designs of the said Exhibition. And after the closing of the Exhibition, the Commissioners are required to sell all property and effects belonging to them, including all the buildings except (in the first instance) the buildings proposed to be leased to the Society of Arts, and to pay all their debts and liabilities, except the loan by the Bank of Engand; and after payment of such debts, and setting apart a reasonable sum for the payment of future expences incident to the completion of their duties, to apply the surplus towards the payment of the Bank of England loan. And after such sale the Commissioners are required to cause a statement of the accounts relating to the undertaking to be made up, and to submit for examination the vouchers for the

receipts and expenditure to the Governor of the Bank of England, the Deputy-Governor of the Bank of England, and the Comptroller-General of the National Debt, and to submit a duplicate of such statement to the Society of Arts for their information; and the Commissioners are directed to ascertain whether or not (having reference, if necessary, to the value of the buildings proposed to be leased to the Society of Arts) there has been a gain or loss upon the undertaking. And in case, irrespective of the value of the buildings proposed to be leased to the Society of Arts, there shall have been a loss, then, if the Society of Arts shall, with a view to obtain a lease of the buildings, be willing to bear that loss, it is incumbent upon the Commissioners, if required by the Society of Arts, to make such arrangement with the Society as may secure to them the benefits of such lease on the Society bearing such loss and undertaking to provide sufficient funds to enable the Commissioners to pay all the remaining debts and liabilities of the said Corporation, including the debt to the Bank of England, and the Society undertaking to indemnify the guarantors from all loss in respect thereof, but in default of the said Society so doing, the Commissioners are required to sell the buildings proposed to be leased to the Society, and to pay the remaining debts of the undertaking; and if any surplus remain, such surplus is to be disposed of by the guarantors in like manner as is directed by the Charter in case a gain is made without resorting to a sale of the buildings proposed to be leased to the Society of Arts. And if there shall have been a gain on the undertaking without resorting to a sale of the buildings to be leased to the Society of Arts, then the Commissioners are directed, if required by the Society of Arts, to pay the Commissioners of the Exhibition of 1851 a sum not exceeding £10,000 as a consideration for their reserving a site containing 16 acres or thereabouts for an Exhibition of the Products of Industry and Art to be held in the year 1872, and in case the Commissioners shall have expended a less sum than £50,000 upon the Society of Arts buildings, then they are ordered to apply in completing such buildings so much of the unexpended portion of such sum of £50,000 as in the judgment of the Commissioners, jointly with that of the Commissioners for the Exhibition of 1851, may be requisite for that purpose. And if after such payments there shall remain a surplus, it shall be applied for such purposes connected with the Encouragement of Arts, Manufactures, and Commerce, as shall be determined by the guarantors, they having votes in proportion to their subscriptions. And it is provided that the services of the Commissioners are to be gratuitous.

TWELFTH ORDINARY MEETING.

Wednesday, February 27, 1861.

The Twelfth Ordinary Meeting of the One Hundred and Seventh Session, was held on Wednesday, the 27th inst., Samuel Christy, Esq., in the chair.

The following gentlemen were proposed for election as members of the Society:—

Cole, John Richard ...	Scarnell-villa, Pembridge-gardens, W.
Croft, Charles Percy, F.R.C.S.	2, Woburn-square, W.C.
Edmiston, Charles S....	5, Charing-cross, W.C.
Fortescue, Dudley Francis, M.P..........	17, Grosvenor-square, W.
Hancock, C. F.	Bruton-street, W.
Lyon, Arthur	32, Windmill-street, Finsbury, E.C.
Marshall, J. G.	Headingly, Leeds.
Part, John Cumberland	186, Drury-lane, W.C.
Quallett, George Watts	10, New Bond-street, W.
Sowerby, William......	16, Park-place, Maida-hill, W.
Weinberg, J. Julius ...	Belfast.

The following candidates were balloted for and duly elected members of the Society:—

Bake, Henry	8, Philpot-lane, E.C.
Davis, Richard	9, St. Helen's-place, Bishopsgate, E.C.
Hare, Thos. Matthew...	31, Essex-street, Strand, W.C., and 6, Torriano-terrace, Gloucester-place, W.
Letts, Thomas............	8, Royal Exchange, E.C.
Walker, William	Kirkstall-road, Leeds.
Weir, Gilbert	7, Queen's-square, Belfast.

And as a Corresponding Member.
Guérin-Menneville, Paris.

The Paper read was—

THE HUDSON'S BAY TERRITORIES, THEIR TRADE, PRODUCTIONS AND RESOURCES; WITH SUGGESTIONS FOR THE ESTABLISHMENT AND ECONOMICAL ADMINISTRATION OF A CROWN COLONY ON THE RED RIVER AND SASKATCHEWAN.

By A. K. Isbister, M.A.

1. Introduction.
2. Sketch of the fur trade in British North America.
3. Early French Fur Companies of Canada.
4. Rise and progress of the Hudson's Bay Company.
5. The North West Company of Montreal and its amalgamation with the Hudson's Bay Company.
6. Constitution, capital, and present commercial operations of the Hudson's Bay Company.
7. Geographical sketch of the Hudson's Bay Territories.
8. The river system of the interior, and the facilities for inland navigation and transport afforded by the interlockage of its waters.
9. Continuous water communication between Lake Superior and the Pacific, by Lake Winipeg, the Saskatchewan, and the Columbia and Fraser Rivers.
10. Route across the Continent.
11. Surveys for a route through the United States territories, and the obstacles interposed to its establishment by the "Great American Desert," west of the Mississippi.
12. Facilities for a route through British territory.
13. Establishment of the NorthWest Transit Company of Canada, and grant to them of an annual subsidy by the

Canadian Government, for the purpose of opening up the communication from Lake Superior to the Red River.

14. Incorporation of the Minnesota and Pacific Railway. Arrangements of Messrs. Burbank, of St. Paul's, in connection with the steam navigation now established on the Red River, for the conveyance of passengers and goods to the settlement within 23 days from Liverpool.

15. Statistics of the rapid progress of population and settlement in Minnesota.

16. Statistics of the population, exports and imports, and yield of gold in British Columbia.

17. Convergence of the various routes from Canada and the United States, and from British Columbia and Oregon, in the Red River Settlement.

18. Statistics of the population, education, revenue, and productions of the Red River Colony, and the valley of the Saskatchewan. Plan for the future Government of the proposed new colony, without entailing any expense on the Home Government.

19. The mixed race of British and Native origin, their numbers, intelligence, and importance in the Hudson's Bay territories.

20. Statistics of the outlying settlements between the Red River and the Rocky Mountains, along the valley of the Saskatchewan.

21. Area of cultivable land of the first quality drained by the Red River and Saskatchewan.

22. Advantages of emigration to the Red River as compared with Canada.

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1. The territories which surround Hudson's Bay, and extend thence westward to the Pacific Ocean, constitute by far the greatest portion of the British dominions in North America. Long held under the exclusive jurisdiction of the Hudson's Bay Company, they have usually been known under the general denomination of the Hudson's Bay territories. Extending from the frontiers of Canada and the United States, northward to the Arctic Sea, and comprising, with the exception of the extreme north-western angle occupied by Russia, the whole of the continent of North America, north of the 49th parallel of latitude; they comprehend an area of nearly 4,000,000 square miles—that is, an extent greater than that of the whole continent of Europe.

The publication of the report and evidence of the Select Committee of the House of Commons, recently appointed to inquire into the trading and territorial privileges of the Hudson's Bay Company, has naturally drawn much attention to these vast countries, hitherto so little known. The still more recent establishment of the colony of British Columbia has revealed the unsuspected wealth and the political as well as commercial value of these long neglected territories, and invested with high importance, more especially the district of country intervening between the new colony and Canada, affording, as it does by means of the magnificent river system of the Saskatchewan, the Winipeg and the Red River, and the chain of lakes and streams connecting them with Lake Superior, a great natural highway of communication between our settlements on the Atlantic and the Pacific—"the key-stone of the arch,"—as it has been not unaptly denominated of our possessions on the continent of North America.

2. The history of these territories is the history of the Fur Trade, that prolific, and expansive enterprise, which, like the search for the precious metals in the South, has been everywhere the pioneer and precursor of civilisation and settlement in the northern regions of the New World. Penetrating in defiance of difficulties and dangers, into the heart of the most savage countries, leading the way to remote regions that might have remained unexplored for ages, it is to the fur trade, affording early sustenance and vitality to the first English and French settlements in America (which, being destitute of the precious metals, were long neglected by the parent countries), that we owe the foundation of that magnificent empire which, under the name of British America, comprehends at this day the oldest, the most populous, and the wealthiest of the colonial possessions of Great Britain.

A brief sketch of the rise, progress, and present condition of this valuable and important traffic will, therefore, be not out of place, by way of introduction to the subject I have undertaken to bring before you this evening.

The fur trade is coeval with the history, not only of English, but of French colonization in America. Although our own intrepid navigators, employed during the 16th and 17th centuries in the ineffectual search for the North-West passage, had brought home from time to time specimens of the valuable furs which the northern portion of the American continent contained, the first regular and permanent traffic with the Indians appears to have been opened up about the beginning of the 17th century, by the French Colony at Tadonsac, a post situated on the St. Lawrence, about 30 leagues below the present town of Quebec. In the year 1627, a company was established, under the immediate auspices of Cardinal Richelieu and other leading men of the period in France, entitled "La Compagnie de la Nouvelle France," this being the name by which the somewhat indefinite possessions of the French in America were at that time distinguished. To this company a charter was granted by Louis XIV., conveying to them the whole of the trade by land and sea, "from the river St. Lawrence to the Arctic Circle and the Frozen Ocean."* Under these and similar grants, made from time to time to other associations, which subsequently sprung up in the colony itself, the French continued to trade, up to the cession of Canada to the British Crown, in 1763, throughout the whole territory, extending from Hudson's Bay on the East, to the Saskatchewan River on the west. Their most distant establishment was on the banks of that river, in lat. 54 deg. N., and long. 103 deg. west. This place was situated at a distance of upwards of 200 miles from the settled districts of Canada; the route to it was through a counry occupied by numerous savage tribes, where the means of subsistence were scanty, and the navigation carried on entirely by means of frail birch-bark canoes; yet, "at these distant establishments," says a recent writer, in the service of the Hudson's Bay Company, "we have evidence that considerable improvements were effected; that agriculture was carried on, and even wheel carriages used; in fact, that they then possessed fully as many of the attendants of civilization as the Hudson's Bay Company do now after the lapse of a century." †

4. It was not until the year 1668 (41 years after the incorporation of Cardinal Richelieu's Association) that the attention of British subjects appears to have been directed to this lucrative field of commerce. In that year a small party of traders, in an English vessel, the *Nonsuch*, under the guidance of two French officers from Canada, who had been induced, in consequence of a dispute with their own government, to offer their services to the English, entered Hudson's Bay, and there founded a small factory, at the mouth of Rupert's River, in the southern part of the Bay, where they wintered. This led on their return, in the following year, to the incorporation of the adventurers into a company, by a Charter from King Charles II., dated 2nd May, 1669; and thus was instituted the Hudson's Bay Company, destined in time to exercise over the wintry lakes and boundless forests of the north, a sway equalled only by that of the East India Company over the voluptuous climes and magnificent realms of the east. This Charter, which continues to the present day to confer upon the Company whatever legal right it may possess to the monopoly it has so long exer-

* Edits Ordonnances Royaux, &c., concernant le Canada, publies par ordre de Son Excellence Sir Robert Shore Milnes, Bart., Lieutenant-Governor of Lower Canada, en consequence de deux Addresses de l'Assemblée, 5 and 7 March, 180 . Vol. i., pp. 3 and 4.

† Life and Travels of Thomas Simpson, the Arctic Discoverer, p. 112. Bentley, London, New Burlington-street.

cised over the fur trade of Hudson's Bay, appears to have been as nearly as possible an unconscious counterpart of that of Cardinal Richelieu's Association. In the same loose and inconsiderate phraseology, it grants to the Company, "all those countries in whatever latitude they may lie whose waters flow into Hudson's Bay," or "to which they could obtain access by land or water out of Hudson's Bay," but "which were not already actually possessed by the subjects of any other Christian prince or state,"—both granters and grantees, being probably at the time equally ignorant, not only of the character but even of the situation of the countries thus prodigally conveyed. This was soon made manifest by the result. The emissaries of the Canadian Company, who had by this time established a regular intercourse by land between the shores of Hudson's Bay and the French Settlements on the St. Lawrence, no sooner reported to the authorities in Canada, the arrival of the new comers, than an armed force was despatched from Quebec, with instructions to expel the agents of the English Company as interlopers on French territory. This led to reprisals on the part of the English, and from this time there began a contest between the two Companies—one settled in Canada and the other in England—for the exclusive trade of the Bay, which was constantly fed by the disputes it gave birth to, till at last, after each of their settlements had been frequently taken by the other, hostilities were terminated by the Treaty of Ryswick, signed in September, 1697, the eighth section of which provided that Commissioners should be appointed to settle the pretensions of the English and French to the trade of Hudson's Bay. By this treaty, the claims of the French to the greater portion at least of Hudson's Bay were definitively acknowledged, and up to the treaty of Utrecht in 1714, they appear to have enjoyed undisturbed possession of nearly the whole of the trade of the disputed territories.* There is but little information respecting the proceedings of the English Company in the interval, but there is reason to believe that their situation was by no means a prosperous one. By the common law of England, a charter from the Crown, conferring a monopoly of trade without the sanction of Parliament, is illegal and void, and as this was the character of the grant of King Charles II., the Company found it impossible to exclude interlopers from the territories over which the charter professed to extend, or to provide any remedy against its repeated infringement by rival traders. At least, we find this the ground of a petition from the company to Parliament, in 1690, for an Act of the legislature to confirm their charter in the usual form. The confirmation was granted, but for "seven years only, and no longer." An application for the renewal of the Act, in 1697, having been unsuccessful, the company have ever since continued to trade upon their unconfirmed charter, and they would probably long ago have ceased to trade at all, had not the Treaty of Utrecht, in 1714, by ceding the territory surrounding Hudson's Bay and Straits to Great Britain, opened up a new and more extended field for their operations. Two courses were now open to the Company—either to petition for a grant of the ceded territories, or obtain an extension and confirmation of their original charter so as to include them; or quietly to take possesssion of the abandoned trading posts, and establish such a footing in the country and the trade as would prevent or overawe all competition. The latter course they resolved, and, without doubt, wisely, (considering the defective character of their charter) on adopting. Their policy henceforth, accordingly, was, and continues more or less to be to the present day, to shroud their transactions in the most impenetrable mystery—to assert on all occasions the rights of their charter, except when there was a prospect of its validity being submitted to a legal test, when they have almost invariably given way, and, above all, to circulate the impression among the public that the whole of the immense territory under their sway was a frozen wilderness, where human life could with difficulty be sustained, and which was fit only for the purposes to which they applied it, of a gigantic preserve for wild animals.

Notwithstanding the abandonment of the shores of Hudson's Bay by the French, the company appear to have made but little advance into the interior of the country, being unwilling probably to excite a competition with their old rivals from Canada, who still continued to carry on their trade from Montreal, through the great lakes to the West, and by the chain of lakes and rivers which communicate with the countries watered by the Red River, and the Saskatchewan, where some of their most important posts were established.

5. The conquest and cession of Canada to Great Britain, in 1763, threw the fur trade of these countries into the hands of British subjects, who, following in the footsteps of the French traders, speedily extended the traffic still farther to the north and west. In the year 1783, a number of these independent traders, having formed a union of interests, established the celebrated North-West Company of Montreal. The agents of this enterprising and energetic association, speedily monopolised the whole of the fur trade of Canada and the North, and after rapidly spreading themselves throughout the interior of North America, to the Arctic Circle and the Pacific Ocean, finally extended their establishments to the shores of Hudson's Bay itself. This brought them into collision with the Hudson's Bay Company, and a contest, marked with great bitterness and animosity, ensued, which, after it had been carried on for many years, and had nearly exhausted the means of both parties, ended in a coalition of the rival companies, in 1821.

6. The new association, which retained the name of the Hudson's Bay Company, possessed sufficient influence with the government of the day to obtain a "License" of exclusive trade over the territories situated west of the rocky mountains—the country on the east side being considered sufficiently protected by the establishments of the two companies already formed there, and such rights as might be claimed under the charter of King Charles II. The License of exclusive trade was granted for a period of twenty-one years, and was subsequently extended by a second License to the end of the year 1859, since which it has not been renewed.

By the Deed-Poll of 1821, regulating the terms of the union, and the organisation of the new Association, there were twenty-five chief factors, and twenty-eight chief traders, appointed in alternate succession from the servants of both companies, to whom, (subject to the control of a governor appointed by the Court of Directors in England,) the management of their affairs in America was entrusted. The profits on the trade were divided into 100 shares, of which 60 were divided among the proprietary in England and Canada. The remaining 40 were subdivided into 85 shares, and each of the 25 chief factors was entitled to two shares, or $\frac{2}{85}$ths; and each of the 28 chief traders to $\frac{1}{85}$th, the remaining seven of the 85 shares being appropriated in pensions to retiring partners, in certain proportions, for seven years. With a few unimportant modifications, the arrangement entered into in 1821 subsists to the present day, when all traces of rival interests may be said to have long since disappeared and

* Mr. Bancroft, in his history of the United States, thus records the result of the Treaty of Ryswick:—"In America, France retained all Hudson's Bay and all the places of which she was in possession at the beginning of the war; in other words, with the exception of the eastern moiety of Newfoundland, France retained the whole coast and adjacent islands from Maine to beyond Labrador and Hudson's Bay, besides Canada and the valley of the Mississippi." Vol. ii. p. 192. Charleroix, in his "Histoire de la Nouvelle France," says, speaking of the same Treaty, "Pour ce qui est de la Baye d'Hudson elle nous resta toute entière, parceque nous en etions les possesseurs actuels." Vol. ii., p. 236. The rights of the Hudson's Bay Company to the exclusive trade of Hudson's Bay, supposing them to have been valid, before, would thus appear to have been effectually extinguished by this treaty, since no reservation was made in their favour by it.

become merged in one united and powerful organization.* At the close of the year 1859, when the license of exclusive trade expired, the operations of the Hudson's Bay Company embraced not only the whole of the British possessions in America, North of Canada, and the United States, but part of the territories of three neighbouring foreign powers. The establishments of the Company had spread not only over the whole of that portion of North America known as Rupert's Land and the Indian territories, but over parts of Canada, Newfoundland, Oregon, Russian America, and the Sandwich Islands, the whole comprehending an area exceeding 5,000.000 square miles—an extent of the earth's surface, probably never before embraced by the operations of a single commercial association.

The recent withdrawal of Vancouver's Island and of British Columbia, and the contemplated withdrawal of other districts from the territories so long held under the exclusive control of the Company, and the claims for indemnity known to be advanced by them on this account, render it a matter of public interest to ascertain the present extent of their trade and the amount of capital invested in these territories, more especially in those portions of the country which have been proposed to be detached from the Company's jurisdiction.

The following in an official statement of the Company's capital and assets, laid before the Select Committee of the House of Commons in 1856 :—

STATEMENT OF CAPITAL AND ASSETS OF THE HUDSON'S BAY COMPANY, JUNE 1ST, 1856.

	£	s.	d.
Amount of Assets	1,468,301	16	3
Amount of Liabilities	203,233	16	11
Capital	1,265,067	19	4
Consisting of			
Stock, standing in the names of the proprietors	500,000	0	0
Valuation of the Company's land and buildings, exclusive of Vancouver's Island and Oregon	318,884	12	8
Amount expended up to 16th September, 1856, in sending miners and labourers to Vancouver's Island, in the coal mines, and other objects of colonisation, exclusive of the trading establishments of the Company, and which amount will be repayable by Government, if possession of the island is resumed	87,071	8	3
Amount invested in Fort Victoria and other establishments and posts in Vancouver's Island, estimated at ...	75,000	0	0
Amount paid to the Earl of Selkirk for Red River Settlement	84,111	18	5
Property and investments in the territory of Oregon, ceded to the United States by the Treaty of 1846, and which are secured to the Company as possessory rights under that treaty, 1,000,000 dols. ... (sterling)	200,000	0	0
Total	£1,265,067	19	4

The distribution of profits to the shareholders from 1847 to 1856 inclusive, ranged from 10 to 20 per cent., and the market value of the stock, during the same period, ranged from 200 to 225 per cent. Of 268 proprietors, of which the Company consisted in July, 1856, 196 had purchased their stock at from 220 to 240 per cent.

The trade carried on by the Company is almost entirely in furs, though small quantities of oil, dried and salted fish, feathers, quills, &c., are also sent to England. Viewed in any other light than as a profitable investment for a few shareholders in London, the trade to the vast continent under the sway of the company is altogether insignificant. The whole of the trade to Hudson's Bay employs, as it did a century ago, not more than two or three ships annually of from 400 to 500 tons each. "The entire value of all the furs and other articles traded by the Comp ny from the Indians in all its territories and possessions averages," according to Mr. Simpson, one of their partners, "less than £200,000 per annum. In one year it amounted to £211,000, and the nett profits for that year were declared at £119,000."*

The affairs of the company in America are managed by a resident superintendent, or "governor," and by 35 resident partners, of whom 16 are chief factors or holders of one share, and 29 are chief traders or holder of one-half share. The company employ also five surgeons, 87 clerks, 67 Indian traders or post masters, 1,400 permanent servants, and about 500 *voyageurs*, besides temporary *employés* of various descriptions, amounting in all to about 3,000 servants of all grades. These are distributed over 152 trading-posts and factories, scattered at distances of 300 or 400 miles apart over the whole country from the Atlantic to the Pacific. Of these 65 are situated within Rupert's Land, the territory claimed under the charter of King Charles 2nd, and protected therefore under a strict monopoly; 30 are within the territory formerly held under the license of exclusive trade which expired in 1858, and are now therefore open to competition; 40 are situated in the unsettled districts of Canada, Labrador, and Newfoundland, and have never been held under any exclusive tenure whatever; 15 are in Oregon and Washington territories, retained under treaty with the United States; there is one establishment at Honolulu, in the Sandwich Islands, and one on the North-West Coast, held under lease from the Russian Government.

Besides their regular servants, the Company give indirect employment to about 150.000 Indian hunters and trappers, dispersed over their immense territories in pursuit of game, by supplying them with the various commodities they require in exchange for their furs. It will hardly be necessary to say that the rates at which furs are bartered, are, through the entire ignorance of their value on the part of the Indians, and the complete monopoly of the trade possessed by the Company, out of all proportion to the market value of the skins in England. "The prices paid to the Indians for their furs," says Mr. Simpson, already quoted "are in general exceedingly small. Throughout the whole of the protected territories, the value of the goods bartered for furs is certainly under one-twentieth of the value of these furs in England, while in places not protected, in order to crush or prevent competition, even more than their full value has occasionally been given; and at the establishments on the outskirts of Canada, the prices permanently offered are from two to tenfold greater than those given to the natives of the regions over which the exclusive right of trade exists."—"Life," &c., p. 427.

The following Table of Tariff, being that employed in the extreme northern division of the Company's territories, where the expenses of transport must be considered as nearly doubling the prime cost of the English manufactured articles, does not for that reason afford a fair criterion of the rates generally allowed the Indians; but it is the only one which I can give from personal knowledge, and it may be relied on as accurate as far as it goes :—

7. The territories embraced in the general operations of the Company, taken at their greatest extent, comprehend, as already stated, the whole extent of country lying between Canada and the Arctic Sea.

A general survey of this vast area presents for notice five great natural regions :—

(1.) The Columbian or Western territory (comprising the Colony of British Columbia, with the adjacent dis-

* This sketch of the fur trade is abridged from a paper by the author in "Chambers' Repository of Useful and Entertaining Tracts."

* Life of Thomas Simpson, the Arctic discoverer, p. 428. London, Bentley, New Burlington-street.

TARIFF EMPLOYED IN THE TERRITORIES EAST OF THE ROCKY MOUNTAINS, EXTENDING ALONG THE McKENZIE RIVER, FROM GREAT SLAVE LAKE TO THE ARCTIC OCEAN.

Prime cost.		Articles supplied to the Indians.	Beaver Skins. No.	Value.			Martin Skins. No.	Value.			Silver Fox Skin. No.	Value.			Lynx Skins. No.	Value.			Otter Skins. No.	Value.		
S.	D.			£	S.	D.		£	S.	D.		£	S.	D.		£	S.	D.		£	S.	D.
22	0	1 Gun	20	32	10	0	60	46	10	0	5	50	0	0	20	20	0	0	20	23	10	0
	1½	1 Gill of Powder ...	1	1	12	6	3	2	6	6	¼	2	10	0	1	1	0	0	1	1	3	6
	1½	18 Leaden Bullets ...	1	1	12	6	3	2	6	6	1 Silver Fox Skin is equivalent to 4 Beaver Skins.	2	10	0	1	1	0	0	1	1	3	6
	1	8 Charges of Shot ...	1	1	12	6	3	2	6	6		2	10	0	1	1	0	0	1	1	3	6
1	6	1 Axe	3	4	17	6	9	6	19	6		7	10	0	3	3	0	0	3	3	10	6
12	0	1 Copper Kettle (6 gal.)	16	26	0	0	48	37	4	0		40	0	0	16	16	0	0	16	18	16	0
	2	1 Fire Steel	1	1	12	6	3	2	6	0		2	10	0	1	1	0	0	1	1	3	6
	4	1 Scalping Knife ...	1	1	12	6	3	2	6	0		2	10	0	1	1	0	0	1	1	3	6
	6	1 File (8 inch) ...	2	3	5	0	6	4	13	0		5	0	0	2	2	0	0	2	2	7	0
	9	Tobac. box & burn. glass	2	3	5	0	6	4	13	0		5	0	0	2	2	0	0	2	2	7	0
	2	1 Common Horn Comb	1	1	12	6	3	2	6	6		2	10	0	1	1	0	0	1	1	3	6
	2½	8 Awls...	1	1	12	6	3	2	6	6		2	10	0	1	1	0	0	1	1	3	6
	3½	1 Dozen Brass Buttons .	1	1	12	6	3	2	6	6		2	10	0	1	1	0	0	1	1	3	6
	3	12 Brass Finger Rings .	2	3	5	0	6	4	13	0		5	0	0	2	2	0	0	2	2	7	0
	4	1 Paper Mounted Mirror	1	1	12	6	3	2	6	6		2	10	0	1	1	0	0	1	1	3	6
	10	1 lb. Beads	6	9	15	0	18	13	19	0		15	0	0	6	6	0	0	6	7	1	0
	3½	6 oz. Tobacco	1	1	12	6	3	2	6	6		2	10	0	1	1	0	0	1	1	3	6
5	9½	1 Blanket (3 point) plain	10	16	5	0	30	23	5	0		25	0	0	10	10	0	0	10	11	15	0
7	0	ditto striped	12	19	10	0	36	27	18	0		30	0	0	12	12	0	0	12	14	2	0
12	0	Man's Slop Coat (large)	12	19	10	0	36	27	18	0		30	0	0	12	12	0	0	12	14	2	0
5	3	Boy's ditto (largest)	5	8	2	6	15	11	12	6		12	10	0	5	5	0	0	5	5	17	6
6	6	1 Pair of Trowsers ...	9	14	12	6	27	20	18	6		22	10	0	9	9	0	0	9	10	11	6
1	9	1 Shirt (Cotton) ...	3	4	17	6	9	6	19	6		7	10	0	3	3	0	0	3	3	10	6
	4¾	1 Handkerchief (Cotton)	1	1	12	6	3	2	6	6		2	10	0	1	1	0	0	1	1	3	6
	3	1 oz. Vermilion ...	1	1	12	6	3	2	6	6		2	10	0	1	1	0	0	1	1	3	6

NOTE.—The selling prices of the furs in this table have been extracted from Mr. Hugh Murray's work on British North America in the "Edinburgh Cabinet Library," from a list which he states to have been furnished to him by the Hudson's Bay Company. The prices of furs are, however, very fluctuating, and since the publication of Mr. Murray's work beavers' skins have fallen greatly in value, while some of the other skins mentioned in the table have risen.

tricts)—a country of varied features, extending from the Rocky Mountains to the Pacific Ocean, and bounded severally on the north and south by the possessions of Russia and the United States.

(2.) The Prairie Region, drained by the Saskatchewan, the Red River and their affluents, and extending from the Rocky Mountains eastward to the chain of Great Lakes. These afford a continuous communication by water from Canada to the Polar Sea in one direction, and, with some interruptions, a similar communication westward with the Pacific Ocean.

(3.) The Wooded Region, occupying the remaining section of the country, to the shores of Hudson's and James' Bays, having for its northern limit the highest feeders of the Churchill River, and continuous southward with the vast primeval forest so well known as the seat of the lumber trade of Canada.

(4.) The strip of sterile country familiarly known as the "Barren Grounds," skirting the shores of the Polar Sea; and

(5.) The Valley of the McKenzie and its tributaries, a well-wooded tract, situated north of the Prairie Region, and comprising the district between the Barren Grounds and the Russian settlements on the north-west coast.

The general character of the different districts will be sufficiently comprehended from this summary. Their united area cannot be correctly given; it certainly exceeds three millions of square miles: it is probably, as already stated, not much under four.

8. Numerous large rivers traverse this extensive country, and one of the most striking features connected with them is the remarkable interlockage of their waters, forming natural systems of water communication by means of which the country can be traversed in every direction. Most of the rivers which drain what has been termed the "Wooded Region," have their outlets in or near James's Bay. One of the most important of these, on account of its situation, is the Moose River and its affluent, the Abbitibee. Both rise in lakes situated on the high ground between Canada and the Hudson's Bay territory, and being connected with the upper waters of the Michipicotton and Ottowa rivers (the former flowing into Lake Superior, and the latter into St. Lawrence,) are accordingly used as the most convenient means of communication between both countries, and are the most frequented road from James's Bay to the great commercial town of Montreal. Another important stream is Albany River, which affords a communication by means of English River and its tributaries and connected lakes, between James's Bay and Lake Winipeg. The Rupert River, which has its outlet at the bottom of James's Bay, and whose head waters are connected with those of the Saguenay of Lower Canada, affords a similar communication in an opposite direction with the Gulf of St. Lawrence, which is thus connected with Hudson's Bay on the one hand, and with Lake Superior, Lake Winipeg, and the Saskatchewan on the other. All these routes are more or less in actual use by the voyagers of the Hudson's Bay Company, and, although in their present condition they are unfit for the navigation of anything but small river craft and bateaux used in the fur trade, the existence of so many means of water-communication, all interlocking with each other, is an interesting feature which may be turned to important account hereafter in the future history of these countries.

9. Lake Winipeg is the centre of another remarkable river system, whose numerous ramifications extend in every direction to the remotest parts of British North America. There is no very strongly marked watershed between Lake Superior and Lake Winipeg—the remote feeders of both often receiving their supply from the same lake. From Savanne Lake, 106 miles west of Lake Superior, the current begins, however, to set steadily northward, forming a very intricate and interrupted line of navigation thence to Lake la Pluie. This lake is connected with the Lake of the Woods by Rainy River, a fine navigable stream, of which we have the following descrip-

tion in the "*Overland Journey*," vol. i., p. 46, of the late Sir George Simpson, the Resident Governor of the Hudson's Bay territories published by Colburne, London.

"The river which empties Lac la Pluie into the Lake of the Woods, is in more than one respect decidedly the finest stream on the whole route. From Fort Frances (on Lac la Pluie) downward, a stretch of nearly 100 miles, it is not interrupted by a single impediment, while yet the current is not strong enough materially to retard an ascending traveller. Nor are the banks less favourable to agriculture than the waters themselves to navigation, resembling, in some measure, those of the Thames near Richmond. From the very brink of the river rises a gentle slope of green sward, crowned in many places with a plentiful growth of birch, poplar, beech, elm, and oak. Is it too much for the eye of philanthropy to discern through the vista of futurity this noble stream, connecting as it does the fertile shores of two spacious lakes, with crowded steamboats on its bosom, and populous towns on its borders?"

From the Lake of the Woods there are two practical routes to Lake Winipeg. That usually followed by the *employés* of the Hudson's Bay Company is by Winipeg River, on account of the trading posts situated on this line of route, and from its affording by one of its tributaries—English River, already mentioned—a ready access to Albany Factory, on James's Bay. The obstructions to its navigation are, however, so numerous and of so formidable a character, that it can never become the channel of any extensive traffic. The second route, a very much shorter communication in point of distance (taking the cord of the arc instead of a long parabolic arc), is from the Lake of the Woods direct to the Red River Settlement, either by land across a level country favourable to the construction of a road,—or by the Reed Grass River, flowing also through a level country, and which might easily be converted into a good canal, but it is at present so impeded by swamps and shallow expansions of the stream as to be impracticable for craft of any larger size than the Indian canoe.

The valley of the Winipeg River, with its romantic but sterile scenery, offers a striking contrast to the Red River, the next important stream to the West, where, according to the Bishop of Montreal, "the open level country extends in one direction all the way to St. Peter's, on the Mississipi, and you may drive a waggon without impediment for hundreds of miles, till you reach that place where you fall at once into a line of American steamers, and have every facility of travelling onwards to any part of the United States, or to Canada."

9. Lake Winipeg receives at its northern extremity its largest tributary, the Saskatchewan, the importance of which, in any consideration of the resources and capabilities of the Hudson's Bay territories, will justify a more detailed description. All the waters which descend from the eastern declivity of the rocky mountains, between 47 deg. and 53 deg. north latitude, unite in two large rivers, the northern and southern branch of the Saskatchewan. Both branches form a junction about 450 miles from their source, and after a course of about 300 miles more, the united stream falls into Lake Winipeg, from which it again issues under the name of Nelson River, and after expanding several times in its course into lakes, finally empties itself into Hudson's Bay, near York Factory. It is navigable, according to Sir George Simpson, for boats from Rocky Mountain House, in longitude 115 deg. west, to Lake Winipeg, in longitude 98, upwards of 700 miles in a direct line, but by the actual course of the stream nearly double that distance. The north branch, whose sources are separated only by "a short portage" from those of McKenzie and Frazer Rivers (flowing respectively into the Northern and Pacific Oceans), descends, according to the same authority, "from Fort Edmonton downward, without a single portage alike for boats and canoes." "Journey," p. 86. The upward navigation is, however, interrupted by a formidable rapid at the entrance of the river into Lake Winipeg, where boats, although they can descend without unloading, are unable to stem the force of the current in ascending, and have, therefore, to be transported over a portage more than a mile in length.

The south branch of the Saskatchewan is in many respects a finer stream than the northern. It rises in the rocky mountains near the international frontier, and completes up to its junction with the north branch, a course of upwards of 500 miles "without any physical impediment of any moment." On arriving at its sources in one of his periodical tours of inspection, Sir George Simpson, who had thus far traced a continuous communication by water from the Atlantic, found it separated from the origin of the Columbia, by a distance of not more than "fourteen paces." An incident so interesting is worthy of being recorded in his own language:—

"About seven hours of hard work brought us to the height of land, the hinge as it were between the eastern and western waters. We breakfasted on the level isthmus, which did not exceed fourteen paces in width, filling our kettles for this our lonely meal at once from the crystal sources of the Columbia and the Saskatchewan; while these two feeders of two opposite oceans, murmu ring over their bed of mossy stones, as if to bid each other a long fare well, could hardly fail to attune our minds to the sublimity of the scene." —*Journey*, v. i., p. 119.

The Columbia, which supplies the remaining link in the route to the Pacific, has a course of about 1,000 miles, including all its windings; and although it cannot in length, in volume, or in facilities of navigation, compete with the great rivers flowing into the Atlantic, it is still a noble stream, having a breadth of more than a mile at fifty miles from its mouth.

"Its navigation," says Mr. Alexander Simpson, who descended nearly its whole course, "has acquired a bad character, in consequence of there being a difficult and dangerous bar at its mouth, on which several wrecks—the last, of an American vessel of war—have taken place. Vessels of large draught of water have certainly much difficulty in entering, and still greater in getting out to sea, for the passage is intricate and tortuous; but the landmarks of the embouchure are bold and easily recognized, and a steam-tug would obviate all risk and difficulty. The bar once passed, there is good navigation for vessels of 400 tons up to Fort Vancouver. Above this the navigation becomes broken by descents of the river over ledges of rocks, but these are not frequent, and although dangerous to a frail boat, the only craft now used, they would but little impede a steamer of good power and light draught of water, such as surmount the rapids of the St. Lawrence. With such, I have no hesitation in saying that at certain seasons the Columbia might be navigated from the ocean to the spurs of the Rocky Mountains."—*The Oregon Territory*, p. 49. London: Bentley, 1840.

The head waters of the Columbia River not only closely approach those of the Saskatchewan, but those also of the McKenzie, flowing northward into the Arctic Sea, as well as those of Fraser's River, flowing through British Columbia into the Pacific, so that here again we have one of these remarkable interlockages of river systems, even among the crests of the Rocky Mountains, which form so characteristic a feature of the physical geography of this portion of the continent of North America.

10. It is along this remarkable line of river-navigation that the fertile tract of country along the Saskatchewan, extends which has recently attracted so much attention, in connexion with the great question of establishing a route across the continent. The idea of such a route, lying wholly within British territory, is daily becoming of more importance, in consequence of the facts brought to light by the surveys for the Pacific Railroad, undertaken by the Government of the United States. These surveys have shown conclusively that, owing to the existence of an immense desert to the west of the Mississippi, no settlement of any importance can be established over a vast extent of country, many hundreds

of miles broad, extending between the Mississippi valley and the Pacific slopes of the Rocky Mountains. It is now known that many of the western tributaries of the Mississippi, which on maps assume the appearance of large rivers, such as the Platte, the Canadian, the Arkansas, and others, are often, in the words of a recent traveller, dried up, and "converted into long detached reaches or ponds, during the summer months, forbidding extensive settlements even on their immediate banks. This great and important physical fact is contrary to popular opinion, which is mainly based upon an inspection of a map and guided by the glowing but utterly erroneous descriptions which are periodically circulated respecting the wonderful fertility of the Far West and its capability of sustaining a dense population."*

11. The physical geography of the arid region in the United States here referred to, has been very admirably described by Professor Henry, of the Smithsonian Institution at Washington. According to this able and trustworthy anthority, "the whole space to the west of the Mississippi, between the 89th meridian and the Rocky Mountains denominated the great American Plains, is a barren waste, over which the eye may roam to the extent of the visible horizon with scarcely an object to break the monotony. From the Rocky Mountains to the Pacific, with the exception of the rich but narrow belt along the ocean, the country may also be considered, in comparison with other portions of the United States, a wilderness unfitted for the use of the husbandman. * * * In traversing this region, whole days are frequently passed without meeting a rivulet or spring of water to slake the thirst of the weary traveller."

"This statement," he continues, "when fully appreciated, will serve to dissipate some of the dreams which have been considered as realities as to the destiny of the western part of the North American Continent. Truth, however, transcends even the laudable feelings of pride of country; and in order properly to direct the policy of this great Confederacy, it is necessary to be well acquainted with the theatre in which its future history is to be enacted, and by whose character it will be mainly shaped."†

The annexed table, drawn up by Professor Hind, from the Pacific Railway Reports of the United States Survey, will convey a very good idea of the formidable character of this barrier to the westward progress of settlement, familiarly known as "the Great American Desert:"—

			Length of Railway.	No. of Miles route through arable land	No. of miles generally through uncultivated lands with small areas of arable soil.	No. of square miles of total arable areas in uncultivable land.
			Miles.	Miles.	Miles.	Miles.
Route near	47th and 49th	Parallel	1864	374	1490	1000
,,	41st and 42d	,,	2032	632	1400	1100
,,	38th and 39th	,,	2080	620	1460	1100
,,	35th	,,	1892	416	1476	2300
,,	32nd	,,	1618	408	1210	230

"This table," adds Professor Hind, "shows that the least distance of uncultivable land, through which a railway from the Mississippi to the Pacific must pass in the United States territory, exceeds 1,200 miles in length—a barrier sufficient to arrest the general progress of settlement for many years to come in a course due west of the Mississippi. The only direction which remains for extensive free soil settlement, in and near the United States, is northward, partially along the immediate banks of the Missouri, about the head waters of the Mississippi and towards the valleys of the Red River and the Assiniboine and the main Saskatchewan. The popular impression that immense areas of land available for the purposes of agriculture, lie between the Missouri and the Rocky Mountain Chain, has, as before stated, been completely refuted by the explorations and surveys for the Pacific Railroad. This important fact cannot fail to exercise a powerful influence upon the occupation of British territory north of the 49th parallel of latitude, and on the sources from which that occupation will flow."

*Hind's Narrative of the Canadian "Red River" Expedition, vol. ii., p. 411.

† "Meteorology in its Connexion with Agriculture," by Professor Joseph Henry, Secretary of the Smithsonian Institution.

12. The communication through British territory, between the Atlantic and the Pacific, which at this moment excites so much interest both in Canada and the United States, has not been lost sight of in British Columbia. Governor Douglas, in a recent despatch to the Secretary of State for the Colonies, thus alludes to the efforts which are being made in that rising and important colony towards the accomplishment of this great national object. He says:—"The great object of opening up roads from the sea coast into the interior of British Columbia, and from New Westminster (at the mouth of Fraser's River) to Burrard's inlet and Pitt River, continues to claim a large share of my attention. The labour involved by these works is enormous; but so essential are they as a means of settling and developing the resources of the country that their importance can hardly be overrated; and I therefore feel it incumbent on me to strain every nerve in forwarding the progress of undertakings so manifestly conducive to the prosperity of the colony, and which at the same time cannot fail ere long to produce a large increase in the public revenue.

"We hope to complete the last section of a pack-road, leading by Derby (Fort Langley) to Lytton (on Thompson's River), a distance of 170 miles, on or before the 1st day of February next. From Lytton a natural road now exists leading to Red River Settlement, by the Coutanais Pass through the Rocky Mountains, and from thence, following the valley of the Saskatchewan, chiefly over an open prairie country of great beauty, and replete with objects of interest to the tourist and the sportsman. A settler may then take his departure from Red River in spring, with his cattle and stock, and reach British Columbia by that road in the course of the autumn following. This is no mere theory, the experiment having been repeatedly made by parties of Red River people travelling to Colville, from whence there is a good road to Lytton; so much so, indeed, that one of those persons assured me that the whole distance from Lytton to Red River, with the exception of the Coutanais Pass,* which is thickly wooded, may be safely travelled with carts. If the Canadian Government would undertake to open a road from Red River to the borders of Lake Superior, which really presents no very formidable difficulties, the connection between British Columbia and Canada would be complete, and the whole distance might, I think, be travelled on British soil." ("Papers relating to the Affairs of British Columbia." Part III. No. 26).

13. It is known that a company, under the name of the North-West Transit Company, has been established in Canada, and incorporated under an Act of the Legislature, with the express object of opening up a communication

* The following table of the height of the principal passes of the Rocky Mountains, between the 32nd and 51st parallels of north latitude, is from Professor Hind's work:—

Passes in the United States.	Feet.	Passes in British Territories.	Feet.
32nd Parallel	5,717	Coutanais Pass, lat. 49° 30m.	6,000
35th ,, ...	7,472	Kananaskis Pass north of 49°	5,985
38th and 39th Parallel	10,032	Vermilion Pass, lat. 51°, 10m.	4,944
41st and 42nd ,,	8,372		
47th and 49th ,,	6,044		

between Canada and Red River, and thence to the shores of the Pacific; and that the Provincial Government has placed at their disposal, under certain conditions, for this purpose the sum of 20,000 dols. per annum for five years. The expeditions organised by the Canadian Government, in 1857 and 1858, under Mr. Dawson and Professor Hind, for the purpose of surveying and reporting on the practicability of opening up a communication between Lake Superior and Red River (the only part of the route which presents any practical difficulty), concur in pronouncing it perfectly practicable. Mr. Hind is of opinion that, by the expenditure of a sum not exceeding £12,000, a combined land and water route may be opened, by placing steamers on the navigable rivers and lakes, and constructing tramroads over the portages, and that by this means the summer communication between Lake Superior and Red River may be accomplished within six days, which will bring Fort Garry within twenty-two days of Liverpool."*

Mr. Dawson proposes another route, by which, with an expenditure of £50,000 on the construction of locks and dams at various points, for facilitating steam navigation on the navigable reaches, the journey from Lake Superior to Red River may be still further reduced to three days. Captain Palisser, who has recently returned from a survey of the valleys of the Saskatchewan, and of the passes of the rocky mountains leading to British Columbia, undertaken under the auspices of the Colonial Office, is of opinion, on the other hand, that the natural obstacles are so great as to render the route from Lake Superior too difficult and expensive for the generality of the settlers, and he considers that the natural access to the Red River settlement is through the United States.

14. In the mean time, as usually happens, while *we* have been deliberating and discussing, our American neighbours have been acting. An enterprising American firm, Messrs. Burbank and Co., of Minnesota, have been running a steamer the whole of the last summer on the Red River, in connexion with a line of stage coaches, to the head of the navigation at Georgetown, by which the journey from St. Paul's to Fort Garry is effected in nine days,—thus bringing the Red River settlement within 12 days of New York. Messrs. Burbank now undertake the transportation of goods from England to Canada, in bond, collecting all charges on delivery of the goods at Fort Garry, and persons desirous of forwarding goods from England for the Red River market, may have the same forwarded from Liverpool, by Allan, Brothers, and Co., care of J. C. and H. C. Burbank and Co. (in bond), St. Paul, Minnesota. The "Minnesota and Pacific Railroad Company," incorporated by the Act of Congress of the 22nd May, 1857, is now engaged in the organization of a line from St. Paul's, in connexion with various lines already opened from the South, by St. Cloud and Crow Wing, to a convenient point on the navigable waters of the Red River. The construction of this line has already advanced as far as Crow Wing on the upper Mississippi, and the company is under engagement to complete the line to St. Vincent, near Pembina, on the international boundary.†

The progress of the American State of Minnesota, bordering on the Red River Colony, (which, as already noticed has obtained possession of the market of this long secluded region, into which it has forced its way and now threatens to flood it with American importations), has, through the extension of its railway system, been rapid beyond all precedent, whether as regards population or commercial development. The following figures, from a recently published report of the Chamber of Commerce of St. Paul, the capital of the State, exhibit this in a very striking light:—

MINNESOTA, FROM 1849 TO 1858.

	Population in round numbers.
1850	4,000
1852	18,000
1854	52,000
1856	100,000
1857	150,000
1858	175,000

Value of Property, shown by the Official Statements of the Basis of Taxation.

	Dollars.
1849	514,936
1855	16,414,157
1856	24,394,395
1857	49,336,673

The steam-boat arrivals at St. Paul's, during the same period, were—

ON THE MISSISSIPPI RIVER (FROM THE SOUTH).

	Arrivals.		Arrivals.
1849	95	1856	857
1850	194	1857	1,026
1855	550	1858	1,068

ON THE MINNESOTA (FROM THE WEST AND NORTH.)

	Arrivals.		Arrivals.
1850	1	1857	292
1855	119	1858	393

16. Respecting the progress of British Columbia, during the short period which has elapsed since its establishment under a separate government, we have a considerable amount of valuable information in the recently published blue books relating to this colony. From the return of the value of imports and customs receipts at New Westminster, for the 12 months ending 31st December, 1859, it appears that the imports amounted to £177,219 7s. 5d., and the customs to £18,464. The entire white population of British Columbia, did not exceed in October, 1859, 5,000 men, with a very few women and children. The value of the export of gold at the same date, was estimated at £14,000 a month, or £168,000 per annum.

17. The rapidly expanding interests of this rising and important dependency on the one hand, and of Minnesota and of the great and energetic colony of Canada on the other, pressing towards the Red River and the Saskatchewan from every side, all point to the imperative necessity of establishing, without delay, an organised government in this important centre, which shall develop the resources of these fertile valleys, with their unmatched facilities of communication, and render available the crude elements of wealth in their mineral and agricultural products, their timber, ores, and fisheries, before they pass under the control of a foreign state, and thus the opportunity be lost to our rulers for ever of planting British civilisation and institutions across the continent of North America. Enough is now known respecting these distant territories, over which monopoly and exclusion have so long thrown a veil of mystery, to satisfy us that the rumours, which despite of all restriction have reached us, of rich and fertile lands, of abundant harvests, and of exhaustless wealth in the waters, the forests, and the mines, are not the exaggeration of an idle fancy, but sober realities. Century after century has passed over the regions watered by the noble streams which drain the vast basin of Lake Winipeg; the natural produce of the soil has decayed upon it year after year, and the leaves of the dark forests have fallen in hundreds of succeeding autumns, and have enriched the plains to an extent with which even the most highly

* "An emigrant could start from Liverpool and proceed to Quebec by steam (eleven days); from Quebec to Collingwood, Lake Huron, by rail (two days); from Collingwood to Fort William, by steamer (three days); and from Fort William to Fort Garry, *via* Arrow Lake and the Boundary Line, (six days); or twenty two days, in all, from Liverpool to Selkirk Settlement." Vol. I., p. 221.

† Report to the Common Council of the City of St. Paul's, on the railroad system of the state of Minnesota, by J. W. Taylor. Published by the Chamber of Commerce of St. Paul, 1859.

cultivated lands of old countries can bear no comparison. Nature has given to these regions also, not only a fruitful soil, but a salubrious climate, and nothing appears to be wanting but the means of communication with its sister colonies on the east and on the west, to render this hitherto sealed land one of the most important dependencies of the British Crown.

18. Situated midway across the continent, the centre of a chain of settlements, which, under a free government, might extend themselves from Canada to British Columbia, lies the Red River Colony, now an oasis in the magnificent wilderness which surrounds it, but which contains in itself all the elements of a prosperous and highly civilised community. It will be unnecessary to occupy your time this evening with any details of the fertility of the rich region drained by the Red River and its tributaries, and its adaptation as regards both climate and soil to the purposes of the agriculturist. After an experience of more than 40 years, it is found that all crops cultivated in Canada not only succeed well at Red River, but often show a yield far in excess of Canadian returns. The climate also, which, though more extreme in winter than at Toronto, is warmer in summer, is equally well adapted for all the operations of husbandry.

Mr. Gunn, a resident for more than thirty years in the Red River Settlement, states, in a letter to the President of the Executive Council of Canada, printed in the Report of the House of Commons, that the yield of wheat per acre is often as high as 60 bushels, weighing from 64 lbs. to 70 lbs. per bushel, and when the average returns fall below 40 bushels to the acre; "we are ready," he says, "to complain of small returns." "Some farms have been known to produce," he adds, "20 successive crops of wheat without fallow or manure." Maize, rice, barley, oats, potatoes, beet-root, onions, carrots, and turnips give similarly favourable returns. Hemp, flax, and tobacco thrive well; melons and cucumbers ripen in the open air; and hops, plums, cherries, currants, a pleasant grape, called the "frost grape," and most of the common garden fruits, grow wild in the utmost profusion. "Horned cattle," says Mr. Gunn, "thrive well, and although very indifferently taken care of by many, are subject to no diseases. Horses are abundant, and prosper here as well as in any other country, after roaming at large, summer and winter, through the woods, where they keep in good condition. Our climate and soil seem to be peculiarly favourable to sheep. It is twenty years since their introduction into this settlement, and I have never seen nor heard of any sickness attacking them. When well fed, ewes produce fleeces weighing from 2 lb. to 3½ lb.; wethers produce fleeces much heavier; the wool is of a good quality, though not very fine." The country, to the west of the Red River colony, consisting of alternating woods and prairie, and watered by numerous lakes and streams abounding in various kinds of fish of the best quality,* is admirably adapted for settlement. On the south, and extending thence westward, nearly to the base of the Rocky Mountains, stretch the immense treeless prairies of the Assiniboine and Saskatchewan, affording pasturage to countless herds of deer and buffalo, from which a large and profitable trade in provisions, tallow, hides, and the famous "bison wool," and other valuable animal products may be established. The declivities of the Rocky Mountains are frequented by herds of the argali, or wild sheep, and the mountain goat, the wool of which has been submitted to examination by the Highland Agricultural Society of Scotland, and found of so fine a quality (equal to that of the finest cashmere or angora) that they were induced, some years ago, to open a communication with the Governor-General of Canada, with the view to the introduction of this fine animal into the mountainous districts of Scotland and Wales.*

One of the most valuable results of the recent explorations of Captain Palisser and Dr. Hector, is the discovery of beds of tertiary coal or lignite, on one of the tributaries of the Assiniboine flowing into the Red River. Long known to exist on the banks of the Saskatchewan, this valuable mineral, which promises to prove of so much importance in the future settlement of this country, and the development of steam navigation on its numerous lakes and rivers, is now found to cover an extent of many hundreds of miles between the Red River Colony and the Rocky Mountains. Associated with it, and occurring in great abundance, is a valuable clay iron-stone ore, an analysis of several average specimens of which, by Professor Hind, gave from 34 to 41 per cent. of pure iron—a yield equal to that of the best English and Scotch clay iron ores. At a short distance west of the Red River, numerous brine springs are found, which have been carefully examined and analysed by Professor Hind and others, and pronounced to be equal to the richest springs in the United States and Canada. Other minerals of very great value, among which may be more especially mentioned large masses of virgin copper, are also found in various parts of the Hudson's Bay territories, and in such abundance as to lead to very sanguine expectations of great mineral wealth being brought to light by a more careful and extended examination of the country. "It would be true economy," says Sir John Richardson, "in the Imperial Government, or in the Hudson's Bay Company, who are the virtual sovereigns of the vast territory which spreads northward from Lake Superior, to ascertain without delay the mineral treasures it contains. I have little doubt of many of the accessible districts abounding in metallic wealth of far greater value than all the returns which the fur trade can ever yield."

As is well known, the Red River Colony is the result of the enterprise of the late Lord Selkirk, who, having procured a large tract of land on the banks of this stream from the Hudson's Bay Company, commenced a settlement here in the year 1812, consisting, in the first instance, of a few Scotch families whom he had brought out with him from Scotland, but to whom were afterwards added several retired servants of the Hudson's Bay Company, who have continued to settle here at intervals ever since with their families. The colony now numbers about 7,000 inhabitants, who appear to possess all the comforts, and many of them even the luxuries of life. Its affairs are managed by a Governor, appointed by the Hudson's Bay Company, and a local parliament, or "Council," selected from the principal inhabitants. Justice is administered by a recorder, a sheriff, and magistrates, assisted by juries as in England. The colony is well supplied with churches and schools. There is an Anglican and also a Roman Catholic Bishop, four Episcopalian, three Roman Catholic, and two Presbyterian churches, with one or more schools attached to each. A college for superior education, and a training school for missionaries and teachers, under the charge of the Bishop of

* The seas and bays on the north and east of the continent into which these rivers fall, are known to abound in whales and seals, herrings, salmon, cod, and other valuable fish. A very important whale fishery has recently been opened in that part of the Arctic Sea lying east of Behring's Straits, and easily accessible by means of the magnificent stream of the McKenzie, which flows without a single impediment calculated to arrest the progress of a steamer from Great Slave Lake to the Arctic Ocean. Admirable Beechey, in his Presidential Address to the Royal Geographical Society in 1857, speaking of the Arctic Expeditions which had been sent in search of Sir John Franklin, says, in reference to this fishery, "I need hardly remind you of the report of the Secretary of the United States Navy to the Senate, to the effect that in consequence of information received from one of our Arctic Expeditions to Behring's Straits, a trade had sprung up in America by the capture of whales to the north of that Strait of more value to the States than all their commerce with what is called the East, and that in two years there had been added to the national wealth of America, from this source alone, more than 8,000,000 of dollars."

* For the report of the Highland Society on the wool of the Rocky Mountain goat, see "Naturalists' Library," article "Ovis Montana."

Rupert's Land, supply instruction of a higher character, and have sent out several young men who have graduated with distinction in our own universities and those of Canada. About twenty outlying settlements and mission stations, radiate in all directions from the Red River Colony, and extend from the shores of Hudson's Bay to the rocky mountains, and northwards as far as M'Kenzie's River. There is thus provided, should it become necessary at any time to abolish the powers of the Hudson's Bay Company, an effective and inexpensive machinery for the administration of the territories which may be withdrawn from them, which it will require merely the appointment by the Crown of a governor and judge, to render complete. The local council at Red River, already trained to administrative duties, and assisted by the missionaries and the more respectable of the retired servants of the Hudson's Bay Company, at the remoter settlements, acting as justices of the peace, with powers to decided ordinary cases of dispute occurring in certain limits of jurisdiction assigned to them, would amply suffice to preserve order throughout any extent of territory which it might be thought desirable to erect into a separate colony, without entailing any expense on the Home Government. The following abstract of the public accounts of the Red River Settlement, ending May 31, 1859, and printed *verbatim* from the official reports, will show the present condition of the revenue of the colony, and the prudent and economical management of its expenditure by the local Council.

PUBLIC SERVANTS' SALARIES.			
Governor of gaol and Sheriff	£30	0	0
Executive Officer	100	0	0
Presidents of Petty Courts...	26	0	0
Collector of American duty	15	0	0
Petty Magistrates	50	0	0
Constables	108	0	0
Total amount of Salaries ...	£329	0	0
GAOLER AND GAOL.			
Gaoler's Salary, Rations and Advances ...	£32	12	6
Gaolers' Wood (for fuel)	4	7	2
Gaol Expenses	3	18	3
Prisoners' Expenses	4	1	6
	£44	19	5
PUBLIC WORKS.			
Labour performed	£34	11	6
Timber	29	1	3
Roads	282	4	2
Bridges	64	3	6
Total amount expended on PublicWorks.	£410	0	5
Sundries	£5	0	6
Rent of Court Houses	6	4	7
FERRY AND SCOW.			
Ferry	£1	8	0
Scow	10	0	0
Total	£11	8	0
Premiums paid for Wolves' Heads ...	35	10	6
Post Office	154	11	11½
Grand Total of Expenditure ...	£996	15	4½
REVENUE.			
By Outstanding Creditor Balance, June 1st, 1859	£869	9	6½
IMPORT DUTY.			
Hudson's Bay Company, on European Imports	788	3	10
Hudson's Bay Company, on American, do.	129	6	7
Settlers, European	351	11	0½
Settlers, American	35	15	4
Total amount of Import Duties ...	1,304	17	4½
Interest on £186 8s., at 4 per Cent. ...	7	9	1
Ferry	6	0	0
Advanced Cash returned	5	0	0
Debtors' Maintenance	0	2	4
Old Materials sold by Board of Works ...	2	5	0
Fines	1	0	0
Post Office	149	16	8
Marriage Licence	1	0	0
Grand Total ...	2,347	0	0
May 31, 1859. To Disbursements... ...	996	15	4½
,, ,, To Balance...	1,350	4	7½
	2,347	0	0
May 31, 1859. By Revenue	2,347	0	0
,, ,, By Balance carried to New Account	1,350	4	7½

Signed. { W. R. SMITH, E.O.
JOHN INKSTER, Auditor.

The revenue is mainly derived from an *ad valorem* duty of 4 per cent. on imports, which it would appear, from the per centage in the above summary, amounted in the year 1858-9, to £32,621 14s. 4½d. It should be mentioned, however, that the trade with the United States has been for some time past growing into importance, and being, from the immense extent of the frontier, not easily checked by fiscal regulations, it is probably not fairly represented by the proportion of duties assigned to it in the table. There are about 9,000 acres in cultivation in the settlement, and the total value of property of every description is estimated at about £150,000.

19. The distribution of the present population of the settlement, with reference to their origin, is as follows:—Settlers of mixed origin, 816 families; Scotch, 116; Canadian, 92; English, 40; Irish, 13; Swiss, 9; Norwegian 1. It is an interesting fact that the half-castes, or mixed race, not only far outnumber all the other races in the colony put together, but engross nearly all the more important and intellectual offices,—furnishing from their number the sheriff, the medical officer, the post-master, all the teachers but one, a fair proportion of the magistrates, and the editor and proprietor of the only newspaper in the Hudson's Bay territories. The mixed race, from the intermarriage during many generations of the company's officers and servants with the native Indians, have, in fact, increased to such a degree that they are at this moment the dominant class in the country. The single fact that every married woman and mother of a family throughout the whole extent of the Hudson's Bay territories, from the ladies of the governors of British Columbia and of the Red River settlement downwards, is (with the exception of the small Scotch community at Red River, and a few missionaries' wives) of this class, and, with her children, the heir to all the wealth of the country —the fortunes made in the fur trade, and the valuable property accumulated at the Red River settlement— is alone sufficient to invest this race with a high degree of interest and importance. The whole of the persons of mixed origin in the Hudson's Bay territories is estimated at about 12,000, of whom about half, and those chiefly of the poorest class, are stationed at the Red River and the outlying settlements, the remainder being either in the service of the Hudson's Bay Company, or stationed at the various trading establishments and missionary stations in the country. Many of them are persons of considerable wealth and intelligence, educated at universities in England and America, and their influence on the Indian races, from which they partly spring, being necessarily, whether for evil or for good, very great, there is a strong and growing feeling among those who have turned their attention to the subject, "that, in the event of any organic change in the government of the country, they should not be neglected or thrust on one side."*

* Hind, vol I., p. 179.

20. The outlying missions and stations in the valleys of the Red River and the Saskatchewan, the *nuclei* of future settlements, between the Red River Colony and British Columbia, are as follows, proceeding from the settlement westward. 1. La Prairie, on the Assiniboine. 2. Fairford, on Lake Manitoba. 3. Notre-Dame des Victoires, Red Deer Lake. 4. Fort Pelly, on the Assiniboine. 5. Christ Church, near Cumberland, on the Saskatchewan. 6. Moose Lake. 7. Nepowewin, on the Saskatchewan. 8. Qu'Appelle, on the Qu'Appelle River. 9. Edmonton, on the Saskatchewan. 10. Lake St. Aune, about fifty miles north-west of Edmonton. The whole settled population of these incipient settlements, consisting almost entirely of converted Indians and half-castes, does not probably amount to 1,000 souls. Owing to the extension of the extremity of the great American desert, previously described, into British territory, a considerable portion of the south branch of the Saskatchewan, which forms its northern limit, is, together with the country intervening between it and the boundary line, unfavourable for settlement, but north of this limit, there is, according to Professor Hind, a broad belt of fertile country, rich in water, woods, and pasturage, drained by the North Saskatchewan and some of its affluents, which extends uninterruptedly from the Lake of the Woods to the Rocky Mountains. He states that the area of cultivable land of the first quality, included between the Red River and the south branch of the Saskatchewan, exceeds 11 millions of acres, and that the extent of land adapted for grazing, is still greater. Timber available for fuel and building purposes; lignite coal, though not equal to true coal, nevertheless suitable for many of the different objects to which true coal is applied; iron ore widely distributed, of great purity and in considerable abundance; salt in quantity sufficient for a dense population—are among the many available resources enumerated by Mr. Hind, as lying within the limits or on the borders of this fertile tract, which, it may be added, is drained by a river of the first class, navigable by steamers, during several months of the year, for 500 miles of its course, and by bateaux for nearly double that distance.

These advantages would, of themselves, if generally known, be sufficient to attract settlers to this region as soon as a regular government is established in the country, but in view of a route to the Pacific, the valley of the Saskatchewan acquires a new and deeper interest, not only as affording a highway of emigration to the gold fields of British Columbia and California, the extent of which no one can foresee, but as supplying the only uninterrupted tract of fertile country hitherto discovered in North America through which a communication could be established susceptible of continuous settlement across the continent.

Another consideration in connexion with this important question, which ought not to be overlooked, is, that by opening this route, a vast extent of fertile land would be thrown open not only to our own surplus population at home, but to the inhabitants of Canada, and our other older North American Colonies. It is a well known fact, that emigration is constantly going on from Canada and New Brunswick, and the other colonies on the Atlantic seaboard, to the prairies in the Western States, because the settler can there proceed at once to the regular cultivation of the soil, without undergoing, as he must do at home, the protracted toil of clearing land covered with forest. The full value of this advantage can be appreciated only by those who have had practical experience of the great and continued labour required to clear off and cultivate a new farm in a densely-wooded country such as Canada, and the obstruction it presents to the making of the roads necessary for the formation of new settlements.

The average rate of clearing land of wood in Canada by a single family, is ten acres a year, and the average cost of hired labour is £4 10s. an acre, which, for a farm of 100 acres, would amount to £450. The settler in a wooded country expends all this, or else nine or ten years of his life, in toilsome struggles to convert his farm into such proportions of open and wooded land, as the settler on the partly wooded and prairie countries of the West finds his land in when first he takes possession of it. The settler on the Red River, or the Saskatchewan, can thus put as much land under the plough and reap the fruit of it, soon after commencing, as the settler in Canada can, after many years of unceasing toil in hewing his farm out of the forest. And if, even to the emigrant inured to labour life in the backwoods, is so toilsome and uninviting, what must it be to the man who has never known what manual labour is—to the unsuccessful merchant or professional man, accustomed to sedentary occupation, whom misfortune may have driven to accept of a free grant from the Canadian Government in some delightful forest on the shores of Lake Huron? How is the unhappy "Mr Dunnup," who has probably never made any other use of his hands than to copy a pleading, and who probably has never seen a tree in his life larger than those in Gray's-inn gardens, likely to get along with the heavy woods? When he goes up to fell a tree as thick as a hogshead and as tall as a church steeple, his heart must sink within him; he can make no more impression on it than a child, but yet it and others must be cleared away before he can raise the barest sustenance for himself and family. To him the clearing of a farm must be a work of painful and harassing toil. What a relief it would be to him to be transported to some prairie settlement near the banks of some wooded stream, where he could strike his plough into the yielding soil without obstruction of root or tree, find timber and fuel for his wants from the nearest wood, and pasture for a thousand cattle on the open plain?* Another advantage possessed by the Red River over Canada, not to be overlooked, is the facility with which roads can be made through the country in every direction. The obstruction which the dense forests of Canada offer to the spread of settlement in that province is well known. It takes, according to the testimony of Mr. Russell, of the Crown Lands Department of Canada, an expenditure of more than a hundred pounds a mile, to make a road through the back wood settlements as passable as the natural surface of the prairie, by the innumerable routes it offers; and when the expenditure is made it gives access only to the land immediately on each side of it. The moment the settlers strike from it to reach land in the back concessions, the obstacle is again encountered, and the expense of opening the road commences anew.

An objection has indeed been made, that, admitting the advantages of the country drained by the Red River and Saskatchewan, as a field for colonisation, there remains the difficulty, arising from its remoteness from any market for its produce, which must always constitute a serious obstacle to its immediate settlement. This is an objection which no practical man will overlook. Every year, however—every step in advance from Canada, from Minnesota, and from British Columbia, tends to diminish the force of this objection, if, indeed, it has not been already met by the successful enterprise of Messrs. Burbank, who, in establishing a steam communication between Minnesota and the Red River settlement, have opened at least—*that* market to its produce. The facility with which a communication can be established by the route suggested by Governor Douglas, between the Saskatchewan and the head-waters of Fraser's River, renders the opening of a new and still more valuable market in the gold regions of British Columbia, now merely a question of time; while on the side of Lake Superior, we have a reasonable prospect of another and a third outlet, through the enterprise of the Transit Company of Canada.

Another objection to the immediate settlement of the

* "The west side of the Red River may be called prairie land; the east side is wooded land. The woods consists of oak, elm, ash, bass or white wood, maple birch, Scotch firs, pines, cedar, tamarac, spruce and poplar." (Gunn. Vide, "Report of the House of Commons," p. 281.)

Red River and Saskatchewan is often advanced, based on the assumption that it cannot be carried out successfully, and ought, therefore, not to be attempted till the intermediate unoccupied regions of Canada, north of Lakes Huron and Superior, be filled up. This objection appears to me to have been very conclusively met by Mr. Russell, whose position, and experience in matters of this nature impart the highest value to his opinion. "The unoccupied region north of Lakes Huron and Superior," he says, "can as little affect the settlement of the Red River country as the thousand miles of the uninhabited shores of the St. Lawrence and Gulf affected the first settlement of Lower Canada. On a smaller scale we have had many similar instances since. The first settlement of the eastern townships, that of Madawaska, on the river St. John, as well as the first settlements on the Ottawa, at Hull, &c. (we might almost quote that of the interior Saguenay), all took place while there was no settlement for a great distance between them and the unoccupied parts of the province. And, in the United States, we might cite the first settlement beyond the Alleghanies, with the fearful addition of Indian wars; and, far more conclusively, the overland emigration to Utah and Oregon, through regions more dangerous and inhospitable, and so much more remote, that our Red River settlement is merely the first station on what is believed to be a more favourable route from the east to the west than that by which these emigrations took place."*

The events which are now transpiring in the United States cannot fail to exercise a most important influence on the opening up of the great territory now under notice. It is unlikely that emigrants will go, for the next few years, to the United States, where they will be exposed to the chances of a civil war. In that lamentable struggle, which seems destined in all human probability to arise amongst the members of that once great Federation, the Western States will undoubtedly take an active part, for they, more than any portion of the Union, have an interest in the navigation of the Mississippi, the mouth of which is already in possession of a foreign power. The tide of emigration, which has hitherto set in this direction, will doubtless, therefore, for some years, be more or less diverted into other channels; and it now rests with our rulers whether or not it is to flow onward to British territory, by removing that baneful Monopoly which has hitherto barred its advance, and by the establishment, in the fertile basin of Lake Winipeg, of a FREE COLONY—the first of a chain of settlements which shall bind our scattered possessions in America into one, and thus, while consolidating our own power, confer a benefit on the world by creating a highway for letters, for traffic, and for travellers across the Continent from ocean to ocean.

DISCUSSION.

The CHAIRMAN said the object of the meeting was not to enter upon any attack upon the Hudson's Bay Company, or to advocate, either by inference or otherwise, any invasion of their rights and privileges; but the Council of this Society, exercising, as he believed, a wise discretion, had thought that they would be aiding in the advancement of the mother country, and the improvement of an immense territory belonging to the British Crown, by giving Mr. Isbister (very liberally as he thought) an opportunity of bringing this subject forward, and affording valuable information as to the resources of that region. He saw many gentlemen around him who were well acquainted with this subject, some of whom had taken an interest in it, as he had done, in the Committee of the House of Commons; and it was now his duty to call upom them to make such remarks as they had to offer.

* Quoted in the "Report of the Exploration of the Country between Lake Superior and Red River," by Mr. S. Dawson, C.E., printed by order of the Legislative Assembly of Canada.

Professor TENNANT remarked that there was great probability of finding in the country treated of a large quantity of the mineral substances briefly noticed in the paper—in fact, for many years large masses of copper had been found in various parts of the district under consideration. Immense quantities of solid pure copper had been brought from thence to this country from time to time, some of them being large masses from the shores of Lake Superior, and weighing many tons. They had a specimen at the Polytechnic Institution at the present time, weighing, he believed, a ton and a half, cut from one of these large masses, and forming only a small portion of the original lump of pure metal. He had placed upon the table a small case of specimens of the various metals produced in this district. Within the last few years, great interest had been excited by the discovery of the existence of gold in that quarter—at Queen Charlotte's Island, Fraser River, and various other districts. He held in his hand almost the first small gold nugget that was brought to England from Australia, in 1851, since which time thousands of tons had been brought from that colony, and he believed that first nugget to which he alluded, which contained gold only to the value of about £32, created more interest and excitement in this country than the last great nugget received, of the value of £9,000. The gold found in the Canadian territory was richer than that of Australia. They heard but little of it at present, but it was being worked quietly to some considerable extent. There was a specimen of 3 ounces in the case on the table, which was not so pure as Australian gold, the latter being worth £4 2s. per ounce, whilst the specimen to which he referred was worth only £3 14s. per ounce. He looked forward to the time when other substances, more valuable in commerce than gold, would be found in these extensive territories—coal, for instance, which in this country was more important to us, as a commercial people, than gold. In Australia there had been found a substance resembling black sand, which was discovered to be oxide of tin, and it was now being collected in large quantities, and sold for £40 per ton, and it paid better than gold. He confidently anticipated that large quantities of copper and other valuable metals would be found in these regions when they had been more closely explored.

Mr. P. L. SIMMONDS said that, seeing so large an attendance, and so many gentlemen competent from practical acquaintance to take part in the discussion, he did hope that the whole bearing of the question brought forward by Mr. Isbister would be thoroughly investigated. This was due no less out of courtesy to a gentleman who had brought much experience and local knowledge to bear on the subject, than on account of its national importance. Much as the subject of the Hudson's Bay Company's territories had been discussed in certain quarters, the general public still entertained very mistaken notions as to their soil, climate, and capabilities. But when descriptions of the country given by persons not under the influence of the Company came to be considered, and people began to reflect that the vast region in question extended from the Province of Canada upwards of 2,000 miles to the north, and of 1,800 miles to the west, and that every degree travelled in the latter direction was in point of climate equal to about half a degree of southing, those who were capable of weighing these facts would certainly be no longer carried away by the misrepresentations which pictured the entire region as an irreclaimable wilderness, fit only for the operations of the trapper and for the permanent residence of the Indian in an uncivilised state; and, therefore, fit only to be monopolised by the Hudson's Bay Company. Yet there was a period when even the authorities of the Hudson's Bay Company drew a very different picture of a great portion of the territory. That was when the North-West Company of Canada carried on operations there, and when the former company coveted the same field, failing to obtain which, they invited to it agriculturists from Canada

and England, with the object of dispossessing or annoying their more enterprising rivals. The following remarks bore upon this question:—

The change which has since taken place in the policy of the Hudson's Bay Company, in regard to the North Western territory, is singularly exemplified by the different tone which they now adopt in speaking of the same region of country. In 1852, the present Earl of Selkirk, a principal partner of the Company, assured Sir R. Murchison (according to the statement of the latter, published in the Journal of the Royal Geographical Society), that "this country offered very few spots indeed adapted for any sort of cultivation." Yet, of the same country, the late Earl of Selkirk, the largest shareholder of the Company, thus discoursed, when it was in the occupation of the North West Company, in a pamphlet his Lordship published denouncing the latter. His words, uttered at that time, are peculiarly applicable to the position and views of the Hudson's Bay Company at this moment:—

"It has been the policy of the North West Company, in pursuance of their object of excluding all other British subjects from their territories, to represent the extensive tract of land stretching from Lake Superior to the Pacific Ocean, and to the northern extremity of the continent, as altogether a wild and uninhabitable region bound up in perpetual snows. Nothing can be more wide of the truth. Not only in the territories of the Hudson's Bay Company, but even in Athabasca, and still more in New Caledonia" (northern part of Oregon), "beyond the Rocky Mountains, there are most extensive tracts of fertile soil, lying under climates perfectly capable of advantageous cultivation. In so vast an extent of country, there must, of course, be great varieties of climate; but there is a breadth of at least twelve or fifteen degrees of latitude, as fit to be inhabited as many of the well cultivated countries of the North of Europe and within this range; extensive districts may be found that are preferable, both in soil and climate, to any of the remaining British colonies on the continent of North America. It is a very moderate calculation to say, that if these regions were occupied by an industrious population, they might afford ample means of subsistence to more than *thirty millions* of British subjects, and these immense resources of national wealth are to be lost sight of for the sake of a trade to the gross amount of two or three hundred thousand pounds per annum!"

The above is confirmed in a remarkable manner by what Mr. McLean, an inhabitant of the territory for 25 years, has recently said of its agricultural capabilities, in a work he has published. His statement is:—"There are many favourable situations for agriculture to be found in every district of the Company's territories, except, perhaps, one or two on the shore of Hudson's Bay. The banks of Athabasca, Slave and Mackenzie rivers present many localities fit for farming operations, and in the more southern districts they are, of course, far more frequent."

Joint-Stock Associations, or close corporate bodies, had not usually been found the best promoters of colonization however useful their efforts might be at present in obtaining capital and attracting public attention. The past experience of the Hudson's Bay, East India, South Australian, Australian Agricultural and New Zealand companies were proofs of this. To take the recent case of Vancouver's Island, he believed the colonization of that island and the extension of settlement and discovery of gold in British Columbia had been materially retarded by the grant of that island for ten years to the Hudson's Bay, whose interests and special objects were necessarily inimical to colonization. He well remembered, about 1848 or 1849, Mr. J. E. Fitzgerald putting himself into communication with the Colonial office to know whether any encouragement or facilities would be given to a large party of worthy and highly respectable settlers who proposed establishing a British colony there. The colonial minister of the day, despite remonstrances in Parliament, proposed to hand over the colony to the Hudson's Bay Company, having ultimately to take it back again, a year or two ago, paying the Company for its buildings and assessed improvements, and Mr. Fitzgerald and his friends went to New Zealand and founded the province of Canterbury, one of the most flourishing and prosperous of the existing provinces of that colony. As he thought it highly important to disabuse the public mind of the erroneous impressions formed as to the sterility of this district, he would have wished that Mr. Isbister had dwelt a little more fully on the capabilities of the country. Travellers of the present and the past agreed in eulogising most of it. Franchere, a voyageur of Montreal, who explored much of the north-west, in the years from 1811 to 1814, thus spoke of the Saskatchewan:—

"It is one of the prettiest rivers in the world. The banks are perfectly charming, and offer in many places a scene the fairest, the most smiling, and the best diversified that can be seen or imagined; hills in varied forms covered with superb groves; valleys agreeably embrowned at evening and morning, by the prolonged shadow of the hills, and of the woods which adorn them; herds of the light limbed antelope and the heavy colossal buffalo—the former abounding along the slopes of the hills, the latter trampling under their heavy feet the verdure of the plains; all these champaign beauties, reflected and doubled as it were, by the waters of the river; the melodious and varied song of a thousand birds perched on the tree tops; the refreshing breath of the zephyrs; the serenity of the sky; the purity and salubrity of the air; all in a word, pours contentment and joy into the soul of the enchanted spectator. It is above all, in the morning, when the sun is rising, and in the evening when he is setting, that the spectacle is really ravishing. I could not detach my regards from that superb picture till the nascent obscurity had obliterated its perfection. Then to the sweet pleasure that I had tasted, succeeded a *triste*, not to say a sombre melancholy. How comes it to pass, I said to myself, that so beautiful a country is not inhabited by human creatures?—the songs, the hymns, the prayers, of the labourer and the artisan, shall they never be heard in these fine plains? Wherefore, while in Europe * * * so many thousands of men do not possess as their own an inch of ground, and cultivate the soil of the country for proprietors who scarcely leave them whereon to support existence * * do so many millions of acres of apparently fat and fertile land, remain uncultivated and absolutely useless?

So mused the thoughtful Franchere in 1814. How aptly do his thoughts in the lone wilderness come up now to illustrate and enforce the grand schemes of the present day! We might almost fancy that the giant shadow of the mighty future pressed for a moment on his pious mind, and showed him the pathway across this great lake direct to the beautiful plains that gladdened his sight, and the myriad toilers of Europe pressing on to enjoy liberty and homes in this enchanting land.

He (Mr. Simmonds) held in his hand a report from Captain Kennedy who had been sent from Canada to the Red River to make inquiry into the condition of trade in that settlement, and the best means of opening a commercial connection with it. These and other documents he would not, however, take up the time of the meeting by reading, trusting rather to hear the practical opinions of gentlemen present. There was one fact stated by Captain Kennedy that the citizens of St. Joseph, Minnesota, on the border line, being chiefly engaged in hunting, were unable to raise enough agricultural produce for their own wants, and had recourse to Red River for their supplies of the same. He also added that with the tangible, unquestionable facts which had been produced, there ought to be no more croaking on the subject of the frozen barren regions of the west. Mr. Thom, the first recorder of Red River, though no friend to progress, once told a jury there that six square miles of such a soil as Red River and yielding as it did, would create greater revenue than all the fur trade put together; supposing each bushel of wheat to be sold at 3s. 6d. per bushel. Unfortunately there was too much apathy and indifference here as to our "insignificant" North American possessions, and he could not but hope that more attention would be given to them both by our public men and the Legislature, and that the recommendation of the Committee of the House of Commons of 1857 for throwing open this district to colonisation would be adopted and free grants of land afforded as in Canada, to those who chose to settle there.

Mr. Herman Merivale said he had taken great interest in this subject, having been formerly connected with the Colonial Department of the Government, and although he was not able to speak upon it from personal knowledge, he had endeavoured to inform himself upon it from the sources which were at his command during his

official career in connection with the colonies, and he should be glad if the few remarks he intended to make were the means of eliciting from those present something a little more definite than they had heard up to this time. He confessed he did not know what was to be the question to be debated at the present moment. He, however, apprehended the real subject under consideration was the desirability of establishing a colony under the Crown of this country in the region between Saskatchewan and Lake Superior and British Columbia, but whether it was intended to extend the question to the consideration of whether or not it was desirable that the Hudson's Bay Company should be turned out of their present position, he did not know. All he could say upon the latter point was, that at the time when he had something to do with the colonies, that company had expressed their willingness to surrender their rights over the districts of the Red River, and it was only a question of indemnity, and how soon, and in what precise manner, this should be done; and if it was desirable that that matter should be expedited by the expression of public feeling, no doubt the present time was a good one for the purpose. But laying aside that consideration for the moment, he would come to the more important question as to the prospects of colonisation in that quarter, and it was on that point he should be glad to hear some observations from those present. The Red River Settlement was formed, as they had been told, about fifty years ago by Lord Selkirk, who introduced a few families. What had they done in those fifty years? They had increased to some 8,000 or 10,000 souls, occupying a small tract of country, very fertile, and situated upon a good navigable river. The land cultivated yielded an ample return, but there were the extremes of climate in that latitude—intense heat in the summer, and intense cold in the winter. Of minerals there were none. It was simply an agricultural district. How was it that greater progress had not been made during the 50 years that the settlement had been formed there? Minnesota, within a much less period, had increased from 10,000 to 175,000 souls, whilst the Red River Settlement appeared to remain stationary. One answer would doubtless be ready, viz., the monopoly of the Hudson's Bay Company; but he should be sorry that those who took an interest in this subject should accept this as the correct answer. The Hudson's Bay Company no doubt held a charter over that district, but any one who knew anything about the American squatters would not suppose that any charter from the Crown of this country would keep them out of that territory, if they had found it worth their while to go into it. The inference to be drawn was that they did not think it worth going to; though, as it was a fertile country, no doubt in time it would be colonised; but he required more definite evidence than he had yet heard to convince him that the time for colonisation had now arrived. But were there no natural reasons for this long delay in the colonisation of this district? There was one which he thought would strike them at once. This country was what had been correctly termed an oasis, a little region in the centre of a vast continent; but it had no natural outlet whatever. It stood at the head of a navigable river, but that river, instead of running into the Atlantic like the St. Lawrence, or into the Gulf of Mexico like the Mississippi, ran into the Hudson's Bay, which was locked up by ice for eight or nine months out of the twelve. On the eastward it had Canada, but for some 300 or 400 miles the country consisted of marshes, which were overflowed for several weeks together. He did not say good roads were impracticable, for nothing could be said to be impracticable to British capital and engineering skill; but at present it did not offer a very promising field for enterprise. On the northward it had Hudson's Bay; to the westward was a very fine tract of country, with two great rivers, a vast prairie, with great herds of buffaloes, and well adapted for agriculture, but they were a long way from everything, and they had no natural outlet. On three sides, at all events, it had no outlet, and communication could only be effected at great labour and expense. Therefore, do what they would, the communication with the Red River must be from the United States of America, and not through Canada. The probabilities of the case were that the country would be peopled at no very distant time, and they might ultimately have an overflow of immigrants from the south; but whether it would be taken up by friends or enemies, by the subjects of our crown, or the subjects of any other government, was most uncertain. When that result was attained, they might, at no distant time, have a further communication with the Pacific; but to attempt to carry that on by communication through Canada, he regarded as a very questionable policy. These were views he had formed from his reading upon the subject, and from the information laid before him from time to time in his official capacity. No doubt a great deal might be said in opposition to these views, but he should be glad to hear it in some really definite and practical form.

Mr. WINGFIELD MALCOLM, M.P., said, having only recently left the district of the Red River, he would offer a few remarks to express his concurrence with the opinions given by the last speaker. It had been his original intention to have proceeded with the late Sir George Simpson, but, ultimately pursued the journey alone. He went from St. Paul's in the first steamer that was put on by Messrs. Burbank up the Buffalo River for a distance of 500 miles, and on to the Red River; he had no doubt this route would ultimately be made navigable for small steamers, and that that was the only practicable route to the Red River he fully believed. He made an exploration to the west, previous to Captain Palisser doing so, through a region which he believed no white man had ever penetrated before, and he found a country rather different from what he anticipated. It was far more mountainous and more barren than he expected; there was nothing in the shape of wood and scarcely anything growing. It appeared to him that the hills were principally covered with immense boulder stones, among which grew the herbage which supported the buffaloes, whilst in some parts of the valley there were a few trees of the *cyprès* species. The majority of the wood was totally unfit for any building purposes, consisting chiefly of white poplar and similar woods. That was one of the reasons why he thought that country would not be colonized in the way some people imagined it would be, for even at the present day a man wanting to build himself a house at Red River had to send to the American boundary to cut timber, as all the hard wood in the neighbourhood of the settlement had been already used. Consequently, if any rapid tide of emigration set in that direction how were they to build their houses, as stone did not exist there? Then again, people living in a temperature 40 degrees below zero in the winter would want something to burn for fuel; and further, the climate created an obstacle to farming, because, although the summer was short and very hot, and the crops grew rapidly, yet they must recollect that a certain amount of cattle was requisite for carrying on agricultural operations, and in the severe winter the animals must be housed, or they would lose nine-tenths of the stock. But there was nothing wherewith to build shelter. That circumstance alone was an immense obstacle in the way of agricultural pursuits. There was another thing he might mention, which had been already alluded to, that was the absence of all markets for the commodities produced from the land; and curiously enough the effect of increasing the means of communication with the United States had been to make American corn cheaper in the Red River settlement than the people could grow it on the spot. That was not a very encouraging prospect for agriculture. As far as the Hudson's Bay Company itself was concerned, he believed the complete colonisation of that territory would do them no harm at all commercially. They did not interfere with that portion which Professor Hind had pointed

out as best adapted for agricultural purposes, and which was merely a narrow belt of fertile land. He believed if the British Government determined to send out a governor, a judge, and other officials, as was suggested in the paper, the acting governor of the Hudson's Bay Company out there would be very glad of it, inasmuch as at the present time he had not only to manage the affairs of the company, but the general government of the country as well, and he would be glad to get rid of one of them. There had been a good deal of petitioning on this subject to the Canadian Government by the half-breeds, amongst whom two or three factions had sprung up. The colony, as at present formed, was a good deal divided in opinion upon political matters. Some thought it a fine thing to be Canadian subjects, whilst others objected to this, but this might all be regarded as a species of "public-house-politics," for in reality they did not want any political change. They did not know what taxes meant, and a duty of 4 per cent. upon imported goods was sufficient to enable them to retain a revenue in hand. From his own experience of the country, he concurred in the opinion expressed by the gentleman who preceeded him that it must be a work of time to establish a colony in that quarter worthy of the name. When the country was ready for it, he had no doubt people would be found to settle there. However desirable such a thing might be, he did not think they would ever make a road from Lake Superior to the Red River, through British territory, which would be able to compete with the railways already established to the Mississippi. They had heard a good deal of talk about the Minnesota railway; but all he saw was a mound of earth with no rails upon it, with some bridges built, and many of them tumbling down. The prospect of the railway had given a stimulus to speculation, but it received a violent check, and property had been sold at a fearful loss In one part of his book he saw that Prof. Hind spoke of a plan for diverting the waters of the southern branch of the Saskatchewan, through the prairie, to the Qu'Appelle River. That would be a grand thing to be done, and he believed it to be perfectly feasible from what he saw, and that would make nearly a straight route to the Red River, and the present great *détour* would be avoided. But there was one great drawback to that plan; that was that the country south of the Saskatchewan was very bad, and was peopled by the only two tribes of Indians who were intractable. He could bear his testimony to the excessively judicious manner in which the Hudson's Bay Company had managed to keep the Indians quiet, by showing that peace was the best policy they could pursue towards the white man; he had himself passed through districts of the territory wholly unmolested, where Indians had feared to accompany him.

Dr. Richard King, as an early traveller in the districts under discussion, begged to take exception to the remarks of the gentleman who last addressed them as to the barren features of the country he had described. He ventured to assert that a more fertile country than that from Montreal to Lake Winipeg could not be found in any quarter of the globe. At all events he would vouch for that being a fact in the year 1833, when he traversed that country, not in a steamer, but in a canoe, with only a few men. The agricultural resources of the country were boundless. The question had been asked how it was that greater advances had not been made by the 8,000 half-breeds already settled in the locality of the Red River. He would not, however, go into that subject. They had heard an opinion expressed by Professor Tennant that this territory would be found rich in mineral products, but the great thing they had to look to was its agricultural capabilities, and in that respect he must be allowed to express an opinion decidedly the reverse of that which had been given by the last speaker.

Capt. Kennedy, from an intimate knowledge of the country, and having left it only the year preceding, would confirm the statement of the last speaker as to the agricultural capabilities of that district, and he was surprised to hear a contrary opinion advanced by one who was so well acquainted with the country as Mr. Malcolm. The distance from Lake Superior to the Red River was only 356 miles, 90 miles of which was traversed by a navigable river, through a country abounding with the finest timber, and highly favourable for settlement. Then, again, there was a further distance of nearly 100 miles, which was traversed by means of an uninterrupted navigation, and there was only the balance of that distance of 356 miles in which some provision was necessary in the way of road communication to the Red River; and was it to be said that a country like this was to be shut out from the development of its resources merely for the want of 166 miles of roads? He concurred in the expression of Professor Hind, that the locality of the Red River was "a paradise of fertility;" and notwithstanding the remarks which had been made as to the slow progress of the 8,000 settlers there, it was the fact that they had built themselves habitations of the woods which had been spoken of as unfit for any building purposes, and the total value of the property of the settlement had been estimated by the last census at no less than £111,000, independent of the money they possessed. As an instance of the fertility of the district, he might mention that he had met with prairie grass growing wild six feet high.

Mr. Davis remarked that the gentleman who had last addressed them had told them that in order to make the communication with the Red River settlement there was a necessity for making some 200 miles of road. By whom he would ask, was that to be done? Was it to be the task of John Bull to give this oasis a start? He believed the time had come when it was thought that colonies, although healthy and valuable children, must take care of themselves. He thought the case of the Red River settlement had been very fairly put by Mr. Merivale. If this was such a paradise, as to climate and fertility, as the last speaker described it, how was it that the existing settlers had done so little toward their own advancement during the 50 years? Upon the subject of the adaptability of the climate for agricultural pursuits, he would take the testimony of a high authority, no less than that of Capt. Palisser, who had expressed his opinion that the breeding of stock could not be carried on to any great extent. His own opinion, from what he had learned from those who had visited the country, was that nature had done much for that region, but still there was the drawback of the long and severe winter, and the short period during which alone agricultural occupations could be pursued. He could not refrain from expressing his regret that so little stress had been laid on the great value of the trade established by the Hudson's Bay Company, viz. the fur trade, for which he was sure they would have the sympathies of the ladies, who considered furs almost as a necessary of life. An American Company started in competition with the Hudson's Bay Company, but it very soon abandoned the enterprise, and the field was once more left open to those who had so long held it. He hoped English agriculturists would think twice before they betook themselves to the Red River settlement.

The Chairman then proposed a cordial vote of thanks to Mr. Isbister for his paper.

The vote of thanks having been passed,

Mr. Isbister being called upon by the Chairman to reply, observed, that he regretted that at that late hour he would be unable to reply, except very briefly, to the objections which had been advanced by some of the speakers in reference to the advantages of opening up the Red River and the Saskatchewan to colonisation. He regretted this, because he felt, while he had been listening to the speakers, that had he been permitted to answer the objections as they arose, nothing would have been easier than to have done so. A few of the principal objections he trusted, however, he would find time to reply to without trespassing too far on the kind indulgence of the meeting. Mr. Merivale, whose long official connection with

the Colonial Office imparted naturally great weight to any observations which fell from him, had dwelt upon the inferiority of the route from Canada to Red River, as compared with that from the United States. Now, as the avowed object of the paper, which had been received that evening with so much indulgence, was to draw attention to the importance of opening up a communication across the continent between our possessions on the east and the west, he really could not see how Mr. Merivale's remarks bore on the question before them. The real question was this—Was it desirable that British Columbia should be connected with Canada, and our scattered possessions on the American continent consolidated? If so, the establishment of a colony in the country lying between them, watered by the Red River and Saskatchewan, was not so much a matter of choice as of necessity. So far from disputing the position that the best access to the Red River Colony was by the United States, he quite concurred in it; and this only showed the necessity of speedy steps being taken to place the country in direct relation to the Crown of England, in order to enjoy the advantages which that relation conferred before this very facility of access from the States of America produced the result which sooner or later it must produce—namely, alienation from a government that took no interest in the welfare and advancement of the country, and sympathy with foreign institutions, foreign ideas, and foreign commodities, a taste for which would grow with their growth and strengthen with their strength. It had been argued that the fact of the slow advance of the Red River Colony, compared with others, was a proof that it was not adapted for a colony. There had been no emigration, no influx of new settlers from any other country. But did gentlemen who urged this objection know what was the nature of the government which was paramount over the Hudson's Bay territories? Did they ever realise to themselves the conception of being governed by a trading company—a shopkeeping government, that bought and sold, and trafficked in every commodity, from a yard of cloth to a yard of tape—who, if you opened a shop at one spot, would open another in opposition to you, and swamp you with their capital and influence? Was there a British colony, was there a civilised country on the face of the earth, where such a government, he would not say existed, he would say, could be tolerated for a day? Was there a single gentleman in the room, who would emigrate to any colony in the British Empire, however favoured by climate, soil, and production, if he knew that in every enterprise he might engage he would have the government of the country as his competitor? Yet such was the state of things at Red River, where the Hudson's Bay Company not only governed the colony but supplied it with groceries. He felt that this was a sufficient reason why a colony so situated did not and could not advance; and why every man with a spark of enterprise, or self-respect, left it as soon as he conld,—and why only such as had peculiar ties to the country, or were too indigent to leave it, continued to remain in it? Why did it not advance? The wonder was, not why it did not advance, but how it continued to exist? He was himself a possessor of land in the Red River Colony, inherited from his father, and had been brought up in the colony, but would as soon think of living in it under its present government as of settling in Kamschatka. A question having been asked, with reference to the land tenure, Mr. Isbister referred to a land-deed in his possession which had been laid before the Committee of the House of Commons, and printed in the appendix to their report, p. 371, which was lying on the table. By this land-deed, no person could hold land under the company without binding himself to abstain not only from all traffic in furs (the natural production of the country) but even in "dressed leather, in any part of North America." He could not export any produce of the land held by him, at any port, except Port Nelson in Hudson's Bay, which was ice-bound 8 months of the year, nor in any ship at this or any port which did not belong to the company, and if after all this it reached London, it was then to be lodged and deposited in some one or other of the warehouses belonging to the Company, who were to be allowed all charges for gaugeage, wharfage, warehouse room, and commission for sale, &c., as was customary in such cases, so that the whole deed was framed as if it was intended to prevent colonists from taking land, rather than to encourage them to settle. It might be said, indeed, that this land-deed was not acted upon; that no agricultural produce ever had been shipped from Red River for the London market, and that, therefore, the land-deed was a dead letter. But would any one say that the mere issuing and publication of such a land-deed, containing such monstrous and ridiculous provisions, was not sufficient of itself to deter emigrants from going to the colony—sufficient to account for its not advancing, apart from all other considerations? He must say, therefore, that the absence of any remarkable progress in the Red River Settlement was easily and naturally accounted for, and did not arise from the causes that had been alleged. It had been stated that the scarcity of wood, which would result from the destruction of the timber on the banks of the river, would leave the settlers without fuel and without building materials. As regarded building materials, there was abundance of excellent stone in the settlement from which several structures, a complete stone fort, some churches, and a few dwelling-houses had already been constructed, and within a few miles of the banks of the river there was a whole mountain of limestone, commonly called in the settlement, "The Stony Mountain," and inserted under that name in the maps of the Canadian Survey. As regarded fuel, the recently discovered beds of lignite coal, on one of the branches of the Assiniboine, flowing into the Red River, and the large deposit on the Saskatchewan, referred to in the paper, would furnish exhaustless supplies when they were really needed. A reference had been made to the dilapidated condition of one of the railways in Minnesota, by one of the speakers, who said that he had recently travelled over them. The statement contained in the paper was based on the information in contained Professor Hind's work, just published, and as he could not speak from personal knowledge on the matter, the discrepancy between Professor Hind and the speaker was one on which he could pronounce no opinion. Professor Hind's statement was as follows:—"St. Paul and Crow Wing will soon be connected by a railway. A large portion of the heavy work on this line is completed, and if no unforeseen events occur, the connection will have been established before the publication of this narrative. Another speaker had hazarded the statement that the breeding of stock could not be carried on in the colony. Now this was really about as unfortunate a statement as it was possible to make. The prairie, on the edge of which the colony was situated, was one vast natural pasture, extending for hundreds of miles, and supporting vast herds of buffaloes, of which every one had probably heard. At the Red River, a farmer had simply to walk out into this prairie, behind his farm, and find there a supply of the finest hay for his stock, of every description, which was absolutely without limit. Upon this hay, as it stood on the prairie, the horned cattle at the Red River, fed far on into the winter, and required only two or three months close housing in the depth of the season; and horses fed upon it all the year round without requiring any care, large herds of these in a wild state being, as was well known, found on the Saskatchewan. As for there being no cattle in the Red River colony, they not only existed, but were annually exported to Minnesota, the colonists having more than they could make use of, and being able to rear them in any number. A reference had been made to the absence of taxation in the Red River colony, and an argument had been based upon it, that the establishment of a Crown colony could not co-exist with this happy condition of life; that the colony could, in fact, only be supported at the ex-

pense of the Home Government. Now, in the first place, to say that a customs' duty of 4 per cent. on imports, was not taxation, was really only a play upon words. There was the very best possible reason why the taxation in the Red River colony was not greater than it was, namely, that it was not wanted—the single tax on imports amply sufficing, as was shown by the official return of the revenue and expenditure given in the paper, to meet all the requirements of the Government. The last year there was a surplus in the colonial treasury of £1,350 4s. 7½d., amply sufficient to pay a governor and judge on the scale on which these functionaries were paid by the Company, and if more expenditure were needed, a very slight increase in the tax would meet the difficulty, which the increasing influx of immigrants and commerce, under an entirely free government, would probably suffice of themselves to meet without even resorting to such an increase. Having now met all the objections which he thought worthy of notice, or which were not met by the facts in the paper, he would only just say one word with referenceto the present government of the Hudson's Bay Company, which had been lauded so highly by one of the speakers. He was not there to say anything in disparagement of the Hudson's Bay Company, with whom he had had, in his life time, a sufficient amount of controversy to satisfy any one man, and towards whom he had not a particle of hostility. It must be borne in mind, however, that the government of the Red River Colony, owing to the pressure of public opinion on the Company in this country, by the numerous discussions on their policy in parliament and the press, and the uncertainty of the tenure of their territories, had been very much modified during the last few years. At present the government of the Red River Colony was practically in the hands of the local council, who, as well the Company themselves, were looking forward from year to year to the complete withdrawal of the colony from the Company's jurisdiction, who were thus on their good behaviour. The present government of the colony was no criterion of what it was a few years ago, or what it would be a few years hence if the Company's power were confirmed and backed by a government force to support them. Neither was it any criterion of the nature of the government which prevailed over other parts of the territory. The Red River Colony was an *imperium in imperio.* Within a radius of 50 miles of Fort Garry, the colony had been erected into a "*Municipality*," subject to the control of its own local government, under its own local governor, who was an entirely distinct functionary from the governor of the Hudson's Bay territories. The real question was not whether the government of the Company was a good or a bad one, for wandering Indians and hunting half breeds; but whether it was a government in which emigrants from Europe could feel any confidence; whether it was a government to which we could safely leave the control of that great and fertile territory so critically situated between our own possessions on the east and the west, and the United States on the south; whether, in short, a colony under them would advance in population, wealth, and intelligence, to form a counterpoise to the rapidly expanding power of the United States, which was rushing onwards like a flood to the north and west, or continue as the Red River Colony now was, an oasis in the wilderness, without the power of rising or expanding.

The paper was illustrated by a collection of furs contributed by Mr. J. A. Nicholay; specimens of minerals by Professor Tennant, and of Indian manufactures by Mr. Henry Christy, to whom the thanks of the Society are due.

The Secretary announced that on Wednesday evening next, the 6th inst., a paper "On the Textile Manufactures of Great Britain," by Mr. Alexander Redgrave, would be read.

Home Correspondence.

COCOA.

Sir,—In a recent number of the *Journal of the Society of Arts* an observation is made as to the difficulty of obtaining pure cocoa.

As large manufacturers of cocoa, in all its various forms of preparation, we beg leave to state that there is an article composed of pure cocoa known as ground cocoa nibs, which possesses an advantage over cocoa nibs in being more easily dissolved. Our long practical experience enables us to correct your correspondent on a point which has perhaps never come under his notice.

There are very few persons who can continue the use of really pure cocoa for any length of time, on account of the large proportion of oil contained in the nut or bean. Those who use cocoa nibs boil them for a time, and obtain a thin, watery beverage, without dissolving the nibs, which are afterwards thrown away, like coffee grounds, but with this difference, that the refuse cocoa nibs have not parted with one half their nutritive qualities.

The ground cocoa nibs above referred to are the pure cocoa nibs ground through a steel mill, so as to render them more easily soluble when boiled in either milk or water, but in thus preparing the beverage, the oil is separated from the nut, and floats on the top of the liquid. It is to obviate this separation of the oil, and hold it in solution, that sugar and various farinaceous substances are combined with cocoa, in all parts of the world where chocolate is used, this being the form in which the largest amount of cocoa is consumed. The various kinds of cocoa in general use in this country are all composed of mixtures of cocoa, sugar, and farina, in different proportions, prepared to suit the wants of different classes of the community; for while very few like to pay the price of pure cocoa, the majority of consumers are of the working classes, who require an article at a price which places it within their reach, and the daily use of tobacco of the commonest description renders them not very fastidious in their palates.

The homœopathic cocoa, alluded to by your correspondent, certainly contains, as its name implies, a very small proportion of cocoa to its general bulk. Cocoa nibs are, of course, the cocoa nuts or beans roasted and broken through a machine, while the shell is separated and blown away. This cocoa shell is shipped largely to Ireland, where there is a demand for it at a low price, and the poorer classes make a drink from it, which is truly called "miserable," for anything poorer or more washy in the shape of a beverage can hardly be imagined, and yet there are some few of the better classes in this country who are compelled, from weak digestion, to use cocoa shells to prepare their morning and evening meal, in preference to either tea, coffee, or cocoa.

We are, &c.,

CAPPER and GRAY.

397, Strand.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Medical, 7. Dr. Kidd, "On Chloroform."
Entomological, 8.
Brit. Architects, 8.

Tues. ...Royal Inst., 3. Professor Owen, "On Fishes."
Pathological, 8.
Photographic, 8.
Civil Engineers, 8. 1. Mr. H. Hooper, "Description of a Pier, erected at Southport, Lancashire." 2. Mr. B. B. Stoney, "On the Construction of Floating Beacons."

Wed. ...Society of Arts, 8. Mr. Alexander Redgrave, "On the Textile Manufactures of Great Britain."
Geological, 8. 1. Mr. F. Drew, "On the Succession of Beds in the Hastings Sands." 2. Mr. J. Kirkby, "On the Permian Rocks and Fossils of South Yorkshire."
Pharmaceutical, 8.
Ethnological, 8½.

THURS...Royal Inst., 3. Prof. Tyndall, "On Electricity."
Roy. Soc. Club, 6.
Linnæan, 8. Mr. George Bentham, "On the Natural Order *Menispermaceæ*, *Bixaceæ*, and *Tiliaceæ*.
Chemical, 8. Prof. Field, "On some New Minerals from Chili."
Artists and Amateurs, 8.
Royal, 8½.
Antiquaries, 8½.
FRI. ......Medical, 5. Anniversary Oration.
Astronomical, 8.
Royal Inst., 8. Dr. E. Frankland, "On some Phenomena attending Combustion in Rarefied Air."
SAT. ......Asiatic, 3.
Royal Inst., 3. Dr. E. Frankland, "On Inorganic Chemistry."
Royal Botanic, 3¾.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered during the Vacation, 1860.

Par. Num.
333. Bills—County Surveyors (Ireland).
334. ,, Fisheries (Ireland) (No. 2).
Parliamentary Cities and Boroughs (Male Occupiers)—Return.
Inland Revenue—4th Report of the Commissioners.
East India (Captain Frith)—Return.
Statistical Tables relating to the Colonial and other Possessions—Part 5.
Trade and Navigation—Annual Statement of the United Kingdom.
Central America—Correspondence, 1856 to 1860.
Public General Acts—Cap. 98 to 154, and Table.

FIRST SESSION, 1859.

208 (E 1). Poor Rates and Pauperism—Return (E).
208 (C 1). Do. Do. Return (C).

SECOND SESSION, 1859.

186 (1). East India (Education) Bengal and North Western Provinces—Papers.
186 (2). East India (Education) Madras—Papers.
186 (3). East India (Education) Bombay—Papers.

Delivered on 15th February, 1861.

19. Navy Estimates.
28. General Committee of Elections—Mr. Speaker's Warrant.

Delivered on 16th and 18th February, 1861.

2 (1). Durham University—Supplemental Return.
21. Post Office—Return.
27. Navy (Ships Building, &c.)—Account.
5. Naval Receipt and Expenditure—Account.
10. Army (Gibraltar)—Return.
24. Bank of England—Annual Accounts.
6. Bills—Highways.
15. ,, Public Offices Extension.
16. ,, University Elections.
17. ,, Church Rates Law Amendment.
26. ,, Law of Foreign Countries.
7. ,, Markets and Fairs (Ireland).
8. ,, Births, Deaths, and Marriages (Ireland).
14. ,, County Rates and Expenditure.

SESSION, 1860.

440. Civil Service Appointments—Report (Corrected Pages).

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, February 22nd*, 1861.]

Dated 25th October, 1860.

2598. A. Verwey, 3, Croydon-grove, Croydon, Surrey—Imp. in the manufacture of soap.

Dated 6th November, 1860.

2724. C. Neumann, New York—Certain imp. in the manufacture of hoop skirts, and in the machinery employed therein.

Dated 19th November, 1860.

2838. G. Chowen, Crediton, Devonshire—Imp. in obtaining motive power by hydraulic means.

Dated 17th December, 1860.

3096. E. Barlow, Bolton-le-Moors, J. Newhouse, Farnworth, and F. Hamilton, Bolton-le-Moors, Lancashire—Certain imp. in machinery for carding cotton and other fibrous substances.

Dated 22nd December, 1860.

3151. A. Savage, 42 and 43, Eastcheap—Improved apparatus for separating, reducing in size, and mixing articles of grocery.

Dated 29th December, 1860.

3185. J. Brinton and J. Lewis, Kidderminster—Imp. in the manufacture of pile carpets, rugs, and other pile fabrics.

Dated 4th January, 1861.

20. T. Cobley, Meerholz, Germany—Imp. in the mode of obtaining or manufacturing commercial salts of lead directly from the ores of lead.

Dated 9th January, 1861.

58. C. N. Leroy, Paris—An improved grease for lubricating the frictional surfaces of machinery.

Dated 11th January, 1861.

76. P. Laffitte, jun., Bordeaux—An improved instrument for writing and printing music.

Dated 15th January, 1861.

108. S. Hemming, Moorgate-street—Improved rifle ranges, and butts and appliances connected therewith.
116. A. G. Lasserre, Bordeaux, France—Imp. in the manufacture of fuel, and in apparatus connected therewith.

Dated 22nd January, 1861.

170. W. Cooke, Charing-cross—Imp. in apparatus for filtering.
176. A. E. Holmes, Derby—Imp. in carriage springs.

Dated 24th January, 1861.

190. F. G. Mulholland, 20, Great Orford-street, Marlboro'-road, Chelsea—Certain improved apparatus for preventing steam boiler explosions, and for decolorizing the gaseous products of furnace fuel in a state of combustion.
197. N. W. Dobeson and G. Warren, Bill Quay Bottle Works, near Gateshead—Imp. in the manufacture of glass.

Dated 26th January, 1861.

212. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in obtaining motive power from the expansion and compression of air, gas, or vapour, and in the machinery or apparatus employed therein. (A com.)

Dated 29th January, 1861.

229. T. A. Verkruzen and M. A. Verkruzen, Hatton-garden—A metal paint, and for applying the same by painting in gold, and imitation gold, silver, or other metal colour on velvet, cloth, and other fabrics having a pile or woolly, or flossy surface.
230. W. Winstanley, J. Kelly, W. Payne, and J. Formby, Liverpool—Imp. in pumps, and the apparatus for working the same.

Dated 31st January, 1861.

262. I. Rogers, Haverstraw, New York, U.S.—Imp. in furnaces for treating iron ores.

Dated 1st February, 1861.

264. E. W. Furrell, Kensington—Imp. in the method of, and apparatus for, communicating between the guards, or the passengers and the engine drivers of railway trains.
266. R. Kunstmann, Manchester—An improved apparatus for lubricating the frictional surfaces of machinery.
268. J. M. Park, Glasgow—Imp. in sun blinds or shades.
270. W. Hart, Norwich—Imp. in sewing machines.

Dated 4th February, 1861.

287. J. S. Larue, Paris—A mode of greasing pistons and slide-valves, even in course of working, applicable to all sorts of machines having the same.
288. D. Walmsley and J. Rostron, Disley, Cheshire—Imp. in apparatus for providing against accidents in hoisting machinery, part of which imps. are applicable to railway carriage coupling links.

Dated 5th February, 1861.

295. G. W. Belding, 3, Moor-lane, Cripplegate—Imp. in skeleton petticoats. (Partly a com.)
297. G. Williams, Liverpool—Imp. in the construction of charcoal and other kilns.
299. J. T. Wood, Strand—An imp. in open work fabrics, suitable for ladies' collars, cuffs, and such like articles, and for purposes for which perforated paper and cardboard are employed.
300. Capt. H. Dixon, 8, Park-end, Sydenham, Kent—Imp. in apparatus for signalling in railway trains.
301. J. Leeming, Bradford—Imp. in looms.
302. J. Purdey, 314½, Oxford street—Improved apparatus for ramming and turning over breech-loading cartridges.

Dated 6th February, 1861.

303. E. T. Hughes, 123, Chancery-lane—Imp. in shuttles for weaving. (A com.)
304. A. Drevelle, Manchester—Imp. in machinery or apparatus for folding or measuring woven or textile fabrics, paper, and other materials, and for introducing cards into the folds ready for the press.
305. J. Marsden, Orrell, near Wigan, Lancashire—Improved machinery or apparatus for making, forging, and punching metal nuts, bolts, spikes, or washers.
307. C. M. J. Bourcier, Paris, and T. Allan, Adelphi-terrace, Westminster—Treating certain animal sinews, in order to convert them into fibres or threads, preparing such threads or fibres in order to prevent decomposition, and the employment of the threads or fibres alone, or mixed with other fibres, for all purposes for which fibres are now used.

308. C. W. Forbes, Southampton—An imp. in rests for rifles and other small arms.
309. W. Clark, 53, Chancery-lane—Imp. in preserving animal substances. (A com.)
310. A. J. Robertson, 26, Parliament-street, Westminster—Imp. in the construction of ships and vessels.

Dated 7th February, 1861.

311. J. Beesley, Coventry—Imp. in looms for the manufacture of ribbons and other fabrics.
312. J. W. Wilson, Beevor Saw Mills, near Barnsley, Yorkshire—Imp. in steam boilers, and in seatings for the same.
313. J. E. Boyd, Hither-green, Lewisham, Kent—Imp. in the manufacture and preparation of paper, and in the method of printing and otherwise preparing the same.

Dated 8th February, 1861.

314. A. Drevelle, Manchester—Imp. in embroidering and ornamenting woven fabrics, felts, or other similar materials.
315. T. Blezard and J. Blezard, Padiham, Lancashire—Imp. in self-acting temples.
316. M. J. Stark, Norwich—Imp. in the preparation of colouring matters for dyeing, staining, or printing fabrics, stuffs, and yarns of cotton, silk, or wool, or such like substances.
317. T. Banks and T. Morgan, Kidderminster—An imp. or imps. in the coating sheets or plates of iron with lead or tin, or alloys of lead and tin.
318. B. Peake, Coventry—An imp. in, or addition to, brocaded silk fabrics.
319. R. Harrild and H. Harrild, Farringdon-street—Imp. in apparatuses for printing addresses for newspapers and other similar purposes.
320. R. M. McTurk, Liverpool—An improved construction of neck tie, and attachment therefor.
321. W. M. Storm, New York—Imp. in the construction of ordnance, and of projectiles to be used in ordnance.
322. J. Branscombe, Noel-street, Islington—Imp. in telegraph cables.
323. W. Morris, jun., Deptford—Imp. in valves.

Dated 9th February, 1861.

324. O. Grimshaw, Belfast—Imp. in locks.
325. H. Freystadt, 36, Broad-street-buildings—Imp. in the manufacture of bodies for caps, hats, bonnets, baskets, bags, and reticules, and other similar articles of light work.
326. C. J. Richardson, 34, Kensington-square—Imp. in the armour or metal covering for iron-cased ships of war.
327. H. Withers, Dundalk—Imp. in horse shoes.
328. G. Jarrett, 37, Poultry—An improved apparatus applicable for marking linen, and for other printing and stamping purposes.
329. D. Ker, Plymouth—Imp. in the construction of submarine telegraphic cables, and in the means of protecting the same from undue strain, and wear and tear.
330. J. L. Jullion, Tynemouth—Imp. in the treatment of soda waste and sulphurets.
331. J. Higgins, and T. S. Whitworth, Salford—Imp in machinery or apparatus for preparing cotton and other fibrous materials for spinning.
332. J. Lockwood, Dudley-hill, Yorkshire—Imp. in healds for weaving fibrous materials, and in machinery for making the same.
334. J. G. Jennings, Holland-street, Blackfriars—Imp. in capsules, or covers for the necks or ends of jars, bottles, and other vessels, and hollow tubes or bodies.
335. A. Leidemann and T. Lange, Newcastle-upon-Tyne—The manufacture of sub or oxi sulphate of lead. (A com.)

Dated 11th February, 1861.

337. E. Gervaise and J. E. Bernier, Paris—Imp. in the manufacture of artificial leather, or a substitute for leather.
338. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Imp. in the heating and cooling surfaces of engines propelled by aeriform fluids. (A com.)
339. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Imp. in the construction of steam generators, employed for heating, drying, evaporating, and other purpose. (A com.)
340. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Imp. in the construction of certain kinds of breech-loading fire-arms. (A com.)
341. W. E. Newton, 66, Chancery-lane—Imp. in floating structures. (A com.)
342. W. E. Newton, 66, Chancery lane—Imp. in machinery for preparing hemp and similar fibrous materials. (A com.)
343. W. S. T. Clarke 29, Charing cross—A railway break.
344. H. Baker, Glasgow—Imp. in the manufacture of lucifer matches.
345. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the construction and arrangement of bearings and grease boxes for shafts and axles, applicable also to the bosses of wheels. (A com.)
346. N. Thompson, Abbey-garden, St. John's wood—Imp in machinery for preparing wood for boat building and other uses
347. R. A. Brooman, 166, Fleet-street—Treating the tobacco plant in order to manufacture paper. (A com.)
349. G. G. Aggio, Nevill's-court—Imp. in stereotype plates, and in machinery or apparatus for manufacturing the same.

Dated 12th February, 1861.

351. W. Oldfield, Noble-street, St. Luke's—Imp. in writing and dressing cases.
353. A. Parkes, Birmingham—Imp. in electric telegraph conductors.
355. A. Parkes, Birmingham—Imp. in the manufacture of the fire boxes of locomotive and other tubular boilers.
357. C. Prater, Charing-cross—Imp. in slings or straps adapted for knapsacks, wallets, game bags, and other such like uses.
359. W. E. Newton, 66, Chancery-lane—Imp. in projectiles for ordnance and fire arms. (A com.)

Dated 13th February, 1861.

361. E. T. Jones, Blackheath, Kent—The suppression of arsenical and sulphurous fumes emitted during the first operation or calcination of copper ores.
365. C. S. Roskilly, Falmouth—Imp. in refining malt liquors.
367. W. Clark, 53, Chancery-lane—Imp. in sewing and embroidering machines. (A com.)
369. C. A. Lawson, Aston, New Town, near Birmingham, and B. Barnes and J. Loach, Birmingham—Certain imp. in projectiles applicable to the use of ordnance and small arms.
371. M. Henry, 84, Fleet-street—Imp. in the construction of a certain description of castor, and in apparatus for manufacturing certain parts of such castors, which apparatus may also be applied for producing rounded bodies for other purposes. (A com.)
373. J. Poole, J. Wright, F. S. Hemming, and G. Searby, 34, Moorgate-street—Imp. in drilling, boring, or excavating rock or other earthy substances.

Invention with Complete Specification Filed.

364. C. F. Atkinson, Sheffield—The application of steel or iron to the manufacture of collars and wristbands to be worn as articles of clothing.—13th February, 1861.

Patents Sealed.

[*From Gazette, February 22nd, 1861.*]

February 22nd.
2027. E. O. W. Whitehouse.
2052. E. T. Truman.
2057. M. A. F. Mennons.
2062. G. T. Bousfield.
2064. G. T. Bousfield.
2066. R. A. Brooman.
2074. C. W. Siemens.
2082. J. Edwards and C. Iliffe.
2083. C. Iliffe.
2086. E. Deane.
2088. R. Perrott, jun., and J. Molony.
2091. W. Kirrage and A. Ripley.
2095. G. P. Dodge.
2100. W. S. Underhill.
2104. P. M. Belton.
2113. M. R. Pilon.
2114. W. Holroyd and S. Smith.
2118. S. Hargreaves, R. Holden, and J. Nuttall.
2138. D. Y. Stewart.
2144. G. Bedson.
2162. C. Stevens.
2164. C. Stevens.
2175. E. Horton.
2309. A. V. Newton.
2346. J. J. O. Taylor.
2612. T. Cobley.
2742. A. J. Sedley.
2857. C. Myring.
2934. J. A. Jaques, J. A. Fanshawe, and G. Jaques.

[*From Gazette, February 26th, 1861.*]

February 26th.
2063. G. T. Bousfield.
2065. G. T. Bousfield.
2079. C. Kilner, G. Kilner, W. Kilner, and J. Kilner.
2103. A. S. Stocker.
2109. W. F. Snowden.
2116. C. W. Harrison.
2199. J. C. de Louvrié.
2275. E. Hunt.
2528. W. Clark and S. Butler.
2627. J. Harris.
2656. J. H. Johnson.
2677. J. Bettjes.
2855. W. Cope, W. G. Ward, and E. Cope.
2935. J. A. Fanshawe and J. A. Jaques.
3173. R. Parnall and H. Parnall.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, February 22nd, 1861.*]

February 18th.
315. J. Beattie.
February 19th.
340. R. Millard.
329. W. Thomson.
330. H. Edwards.
February 20th.
340. W. Betts.
347. J. Potts.
365. J. Petrie.

[*From Gazette, February 26th, 1861.*]

February 21st.
319. R. Griffiths.
624. A. L. Thirion.
February 23rd.
376. J. Templeman.
384. W. A. Gilbee.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, February 22nd, 1861.*]

February 19th.
416. E. Gessner.
February 20th.
405. W. Milner.

[*From Gazette, February 26th, 1861.*]

February 21st.
429. S. Colt.

Journal of the Society of Arts.

FRIDAY, MARCH 8, 1861.

INTERNATIONAL EXHIBITION OF 1862.—GUARANTEE DEED.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others who take an interest in the Exhibition, will make it convenient to call there and attach their signatures to the Document.

GUARANTEE FUND FOR THE EXHIBITION OF 1862.

The following additions have been made since the last announcement in the *Journal* for March 1:—

*** *The names marked with an asterisk are those of Members of the Society of Arts.*

NAME.	AMOUNT.	REPRESENTING THE OBJECTS OF THE SOCIETY—ARTS, MANUFACTURES, AND COMMERCE.
*John Jackson, jun., 49, Rathbone-place, W.C.	£100	Arts.
James Mc Connel, Manchester	100	Commerce.
James Reiss, Manchester	500	Commerce.
*Benj. Dobson, Mere Hall, Bolton, Lancashire	100	Commerce.
B. M. Power, 19, Gresham-street, S.W.	2,000	Commerce.
Birkbeck and Tongue, 24, Southampton-buildings, Chancery-lane, E.C. ...	300	Manufactures.
Sir Charles Lyell, 53, Harley-street, W.C.	300	Commerce.
Norman Mac Leod (of Mac Leod), 9, Cambridge-square, Hyde-park, N.W. ...	500	Commerce.
Geo. Doveston (Doveston, Bird, and Hull), Manchester	300	Commerce.
Joseph Heron, Manchester	250	Commerce.
William Agnew, Manchester	100	Commerce.
Henry Stubbs, Manchester	200	Commerce.
James Standring, Margate (Mayor of)	100	Arts.
Thomas Agnew, Manchester	100	Commerce.
John Fowler, C.E., 2, Queen's-square-place, S.W.	1,000	Commerce.
Wm. Henry Cremer, jun., 210, Regent-street, W.	200	Arts.
John Robinson (Sharp, Stewart, and Co.) Manchester	500	Manufactures.
Robert Gardner, Manchester	500	Commerce.
Harrison Blair, Manchester	200	Commerce.
Sigismond James Stern, Manchester	500	Commerce.
John Siltzer (Siltzer and Co.), Manchester	500	Commerce.
John Pender (Pender and Co.), Manchester	500	Commerce.
Thomas Ashton, Manchester	500	Commerce.
Thos. Hoyle and Sons, Mayfield Print Works, Manchester	1,000	Manufactures.
John Stevenson, Canal Foundry, Preston	100	Commerce.

By Order, P. LE NEVE FOSTER, *Secretary.*

THIRTEENTH ORDINARY MEETING.

Wednesday, March 6, 1861.

The Thirteenth Ordinary Meeting of the One Hundred and Seventh Session, was held on Wednesday, the 6th inst., Sir Thomas Phillips, Chairman of the Council, in the chair.

The following gentlemen were proposed for election as members of the Society:—

Adam, James S.	8, Philpot-lane, E.C.
Allhusen, Christian ...	Newcastle-on-Tyne.
Arthur, James Kennedy	18, Somerset-street, Portman-square, W.
Brooke, William	Brook-street, Manchester.
Burke, John S.	4, Queen-square, Westminster, S.W.
Chambers, George	11, George-yard, Lombard-street, E.C.
Dumergue, Edward ...	Cleveland-walk, Bath.
Etches, Wm. Jeffery...	The Park, Litchurch, and Derby.
Finden, Rev. George Sketchley	Brookside-house, Little Kimble, Tring.
Forster, H. Rumsey ...	
Gibbs, Henry Hucks	St. Dunstan's, Regent's-park, N.W.
Guedalla, H.	Gresham Club, City, E.C.
Hutchins, E. J.	6, Kensington Palace-gardens, W.
Ibbotson, Thomas H.	12, New Brown-st., Manchester.
Letts, Thomas, jun. ...	Sydenham, S.E.

Oakley, Henry	Great Northern Railway, King's-cross, N.
Rose, William, A.......	Queenhithe, E.C.
Stevenson, John.........	Canal Foundry, Preston.

The following candidates were balloted for and duly elected members of the Society :—

Durham, the Earl of ...	35, Grosvenor-square, W., and Coupland Castle, Wooler.
James, Jabus Stanley...	26, Watling-street, E.C.
Powis, Charles	26, Watling-street, E.C.
Wood, Thomas, Ph.D.	123, Upper Thames-street, E.C.

The Paper read was—

ON THE PROGRESS OF TEXTILE MANUFACTURES IN GREAT BRITAIN.

By Alexander Redgrave, one of H.M. Inspectors of Factories.

The object of this paper is not to give a history of the textile manufactures of this country—to sketch their rise and progress, from the days when our forefathers clothed themselves in the skins of the beasts which provided them with food and raiment, to the present day, when the delicate cambric is prized only for its beauty and lightness. The object is rather, in these days of general progress, to collect together a few facts which are to be found scattered about, and to exhibit the present extraordinary and wonderful degree of magnitude and perfection to which the production of textile fabrics by power in this country has arrived.

Historians claim for textile fabrics the earliest mention of any clothing in Holy Writ. We read that our mother Eve, exhibiting the true character of the woman as a thrifty and industrious wife, made herself a garment of fibrous material *sewed* together. The early history of clothing shows us that, in the beginning, there was produced, in every country, a sufficiency of some kind of clothing suitable and adapted for the covering and warmth of the inhabitants. If we look to the north and south poles, we find there animals whose fur and skin form the proper and sufficient dress of the inhabitants of those ice-bound shores; while if we look to India, we there find the garden of the cotton plant, and materials made from it suitable and proper for covering in the varied seasons of that magnificent peninsula. But the intercourse of nation with nation, and the happy knowledge gained in that intercourse, that one country possessed that which might be useful to another, and which might be exchanged for that which was also serviceable to itself, led to the interchange of commodities, the gradual adoption of new customs and the creation of new wants which required to be satisfied. Thus the primeval dress of our first parents, which has been variously denominated as "aprons" and "breeches," was gradually superseded by other and more enduring habiliments, and their descendants, becoming acquainted with the art of manufacture, and being imbued with the knowledge of colour, arrayed their loved ones in "coats of many colours;" and when they mourned, they sat, as did Israel when bewailing the loss of Joseph, in "sackcloth."

The manufacture of fibres was, in early days, an employment of the noble and great,—it was not confined to the servile classes. The occupation was analogous, probably, to the embroidery and needle-work of the present day. As ladies now embroider altar-cloths and velvet-hangings for our churches, so did the children of Israel of old bring free gifts for the tabernacle, as we read in Exodus:—"And all the women that were wise-hearted did spin with their hands, and brought that which they spun, both of blue and of purple, and of fine linen." Quotations might be multiplied *ad infinitum*, showing the estimation in which these arts were held, and the prosecution of them by women of high degree. In the "Odyssey," Homer makes Antinous thus describe the occupation of Penelope, who puts off her suitors until she shall have completed her web, of which, however, she unravelled at night the portion she had woven during the day, in order to postpone the announcement of her decision:—

> "While she laborious, in delusion spread
> The spacious loom, and mixed the various thread."

And again, in the "Iliad," Homer bears testimony to the coquetry in little things among the damsels of his day, for he describes the running of Ulysses, in the races at the funeral games in honour of Patroclus, thus:—

> "Next Ulysses, measuring pace with pace
> Behind him, diligently close he sped;
> As closely following as the running thread
> The spindle follows, and displays the charms
> Of the fair spinner's breast and moving arms."

Descending nearer to our own country and our own times, it is said that the mother of Alfred the Great was skilled in spinning, in which art she also taught her daughters to be proficients, and Alfred himself was accustomed to call the female branches of the family the "spindle-side" of the house; and I am certain that this derivation of the term "spinster" ought to prevent its use in any sense but as a mark of honourable distinction. One of the most distinguished orders of knighthood, *i.e.*, the Order of the Golden Fleece, was instituted by Philip the Good, Duke of Burgundy, in 1429, not to mark any distinguished act of gallant and honourable feeling, as that which prompted the institution of the Order of the Garter, but on the occasion of that prince having made an enormous profit by the sale of wool, for which his territories were then noted, territories which still produce some of the finest wool; and the creation of this order of knighthood was a just tribute to the enterprise and intelligence of the burghers and traders in that fruitful and rich kingdom.

As, however, population increased, and the necessity for the production of the coarser kinds of clothing became more urgent, the occupation of spinning and weaving descended in the scale, and became the employment of the lower classes. In this country, doubtless, wool was the chief material used for clothing, although flax was also much worn, but the climate, the heat and cold, the sunshine and rain, were best provided against by the former.

Wool entered most into the economy of dress from its adaptation either as a lighter or a heavier substance, to meet the sudden and frequent changes of temperature, to which as islanders we are subject. Our woollen manufactures were, however, greatly improved by the introduction of foreign weavers by Edward III. and Queen Philippa, in the 14th century, and subsequently by other sovereigns. These artisans were brought from the Low Countries, in which the manufacture of textile fabrics, especially of wool, then flourished. They introduced new kinds of goods, and gave a great impetus to the woollen manufacture. But according to the principle of those days, a principle which, moreover, has not long ceased to prevail in the present day, the woollen manufacture required "protection." The legislature, therefore, at a very early day, prohibited the exportation of English wool, and imposed a heavy fine upon the wearer of any foreign cloth. It continued to protect the manufacture in the time of Charles II., by ordering the shrouds of all persons to be made of woollens; in the days of William III., of Anne, of George I., and George III., by prohibiting the importation of the printed calicoes of the East, by imposing a heavy fine upon the wearer of such printed calicoes; by imposing a duty of 3d., and afterwards 6d., per yard upon the printing of calicoes; by requiring linen to be used as warp, and by various other vexatious enactments. Notwithstanding the grievances of the woollen manufacturers, even in those days of sumptuary regulation, cotton goods found their way into the country, and were appreciated to their full value, admirably suited, as they are, for a climate such as ours, and for domestic purposes amongst our household. The want once created in this country was followed, as a

matter of course, by the attempt to supply that want, as much as possible, by our own means. The raw material was imported, and manufacturers endeavoured to compete with the productions of India. They were, however, hampered by the legislative restrictions which I have already noticed, by being required to use linen as a warp, and other like regulations, but little by little these regulations were abolished, until at last the excise upon the printing or dyeing of British made calicoes was repealed in the year 1831.

The change from the manual labour of the spinning-wheel to the factory system, commenced by the erection of mills in which the machinery was moved by water. The valleys of Lancashire and Yorkshire became covered with mills, as the streams had generally a considerable fall, and were thus well adapted for water-wheels. Sir Richard Arkwright erected his mills upon streams in Derbyshire, from which cause the twist spun by him was originally called water-twist. It is just one hundred years since the first improvements were broached. The spinning-wheel was, in 1760, the ordinary machine in use for spinning all kinds of fibres, producing one thread at a time; but the demand for cotton goods, which had become fully appreciated, caused the improvements which began with the invention of a spinning machine turned by the spinner's hand, for producing eight threads at a time instead of one, and which have been followed by the adaptation of the principle of that machine to produce 1,200 threads at a time by the motion of the steam-engine.

Four names have been associated with improvements in cotton machinery, who, if not all of them the actual inventors, were the utilisers and practical adapters of ideas which had been unfruitful until their discernment discovered the value of them,—Arkwright, Strutt, Hargreaves, and Crompton; these men, and others who succeeded them, completely revolutionised the trade of cotton-spinning. The domestic occupation carried on in cottages, upon rude machinery, requiring for the production of the fabric no slight bodily labour, was now transplanted into spacious factories, erected in airy and open situations, and while the bodily labour of the operative was lessened, his attention and activity were still called into full exercise. The mills erected by Sir Richard Arkwright are most interesting buildings at the present day. The sites chosen, doubtless on account of the sufficiency of the fall of the streams to move the machinery, are nevertheless situated in spots of great beauty in Derbyshire, on the Derwent and other streams. The following is a description of one of these mills—that at Cromford, or Matlock—which is still occupied by the descendants of Sir Richard Arkwright:—

> "Where Derwent guides his dusky floods
> Through vaulted mountains and a night of woods,
> The nymph Gossypia treads the violet sod,
> And warms with rosy smiles the watery god.
> His ponderous oars to slender spindles turns,
> And pours o'er mossy wheels his foaming urns;
> With playful charms her hoary lover wins,
> And wields his trident while the monarch spins.
> First, with nice eye, emerging naiads cull,
> From leathery pods the vegetable wool;
> With wiry teeth revolving cards release
> The tangled knots, and smooth the ravelled fleece;
> Next moves the iron hand with fingers fine,
> Combs the wide card, and forms the eternal line;
> Slowly with soft lips the whirling can acquires
> The tender skeins and wraps in rising spires;
> With quickened pace successive rollers move,
> And these retain and those extend, the rove;
> Then fly the spokes, the rapid axles glow,
> While slowly circumvolves the labouring wheel below."

Lower down the same river, the Derwent, we meet with two other cotton spinning mills, the spindles of which are moved by the "watery God,"—the Belper and Milford mills, belonging to the Messrs. Strutt. The systematic cleanliness and order which pervade these mills are beyond praise. The machinery is kept scrupulously clean, the floors rival the polished wainscot of a library, the walls are bright with the whiteness of limewash, the air is clear and free from dust, and those whom the poet calls "emerging naiads," and we in the vulgar tongue "factory girls," have some claim, perhaps, to the ethereal character of the poet, in that they are happy, smiling, prosperous creatures, cleanly to a degree of perfection, tidily clad, healthy and robust. The child of eight or nine years and the elderly woman must be equally clean. The habit thus inculcated so early, and insisted upon throughout, is carried with them to their homes, and an incalculable benefit is conferred upon them by these admirable regulations. But these are only a part of the characteristics of the management of these mills. The hands are known to the principals, their health is cared for, their abilities are not overtaxed, the children are educated—in fine, these establishments are not places of toil, but homes, presided over by men of enlarged sympathies and warm appreciation of their opportunities of doing good.

But the invention of Watt no longer required the manufacturer to erect his mill at the side of a rapid stream—provided he could obtain coal, he had no longer to depend upon the varying force of the Derwent, the Ribble, or the Irwell. From this date factories became gregarious, and the rapid extension of some of our manufacturing towns, and the creation of others, are due to the steam engine. One mill has arisen after another, tall chimneys, vomiting black smoke, tower above the head in every street; the machinery which moved in the old water mills at a stately although at a somewhat rapid pace, in these new steam mills rushes at a headlong speed, moaning, whirring, and clattering; the approach to the mills is through a dense population; activity, life, and business prove the altered and enlarged sphere of the factory system. With the increase of factories, the happy valleys have become busy towns — hundreds of people dwell where ten formerly had their abode; the old charities have been remodelled—new wants have been provided for by Mechanics' Institutions, evening schools, free libraries, baths, wash-houses, and parks. The increased populations congregated together under the new factory system have the sympathy of the manufacturers, who, with a wise and humane liberality, promote, by every means in their power, the amelioration of their social and physical condition.

Various duties, of customs and excise, levied upon raw produce and materials used in manufacture are happily at an end. The hindrance of excise regulations may be conceived when it is stated that the calico printer could not pack and send off his goods until every piece had been measured and stamped by the officer of Excise. The whole of the manufacturers of textile fabrics may now buy the raw material, wash, spin, weave, bleach, print, dye and stain their goods without let or hindrance from any fiscal regulations.

The full vigour of the factory system was somewhat restrained by the various restrictions to which I have already alluded, but the wise abandonment of a restrictive policy, and the adoption in its integrity of freedom from legislative regulations, gave to our manufacturers a vast impetus, the effects of which continue to the present day, in the increasing development of the trade. The following figures will enable us to appreciate the extent of our textile manufacturing establishments. They were collected in 1856, but there has been, even within the last four years, a very considerable increase and extension of the various factories in the country.

Factories in Great Britain and Ireland in 1856.

There are four classes of raw products convertible into textile fabrics:—these are cotton—wool and worsted—flax, hemp, and its tribe—and silk. Wool and worsted, although the same material, are of a different nature, and require to be manufactured in a different manner; they are, therefore, treated of separately, and it is usual to divide the textile fabrics into five classes.

The cotton trade represents more than one-half of the whole of the textile fabrics.

The woollen manufacture, once the chief textile industry of the country, ranks second in importance.

Worsted, which is obtained by separating the long fibre of the wool from the shorter staple, ranks as the third.

Flax is fourth; and silk is the fifth and last.

There are various methods of exhibiting the extent of these manufactures, in some of which, perhaps, the order in which I have enumerated them might be varied, but taking the general importance and probable value of the several branches of manufacture, the order in which they have been named will be found the most correct.

Statistics have been procured, at intervals, by the Inspectors of Factories, with reference to the establishments under their supervision, viz., those in which either of the raw materials enumerated are spun or manufactured. No account has ever been taken of the print-works, bleaching and dyeing works, lace factories, &c., which are excluded from the operation of the Factory Acts, and the following figures refer, therefore, to those establishments only in which the first processes of manufacture, up to and including the weaving, are carried on by the aid of water or steam power.

	No. of Factories.	Horse-power.
Cotton	2,210	97,132
Wool	1,505	25,901
Worsted...	525	14,904
Flax	417	18,322
Silk...	460	5,176
	5,117	161,435

	No. of Spindles.	No. of Power Looms.
Cotton	28,010,217	298,847
Wool	1,786,972	14,453
Worsted...	1,324,549	36,956
Flax	1,288,043	7,689
Silk...	1,093,799	9,260
	33,503,580	367,205

	No. of Persons Employed.		
	Males.	Females.	Total.
Cotton	157,186	222,027	379,213
Wool	45,583	33,508	79,091
Worsted	30,023	57,771	87,794
Flax	23,446	56,816	80,262
Silk	16,899	39,238	56,137
	273,137	409,360	682,497

As I have before stated, the above figures refer only to persons employed in establishments subject to the provisions of the Factory Acts, amounting to 682,497, and I have estimated, after making various calculations, and consulting the best authorities, that there are 887,369 persons employed upon textile fabrics in establishments not under the provisions of the Factory Acts, which two classes of persons have dependent upon them at least 3,000,000 of unemployed persons, representing a total of 4,568,082 persons dependent upon the textile fabrics for their maintenance; being in the proportion of 16 per cent., or one-sixth of the population. But there are others, though not directly employed upon the fabrics themselves, equally dependent upon the prosperity of textile manufactures for their subsistence—for instance:—

Those engaged in the procuring of coal (at least 3,000,000 tons are consumed per annum in factories, print-works, &c.). Those engaged in the procuring of iron—engine and machine makers. Those engaged in the leather trade, in the manufacture of grease, in the procuring of oil, dry wares, paper, skips, or baskets, and of various minor articles used in manufacturing establishments. Those employed in warehouses, &c., &c.

At a moderate computation, I reckon that the above persons and their families would raise the number of those dependent upon the textile fabrics to 20 per cent., or one-fifth of the population.

Factories in Europe.

Such is the manufacturing power of British factories. I regret that the means do not exist for comparing all these statements with the statistics of foreign countries. Although in some countries accurate accounts are taken by the government of the various occupations of the people, and the size and extent of industrial establishments, yet so much of that which is performed under the factory system in England, forms part of a domestic system abroad, that it is not easy to institute a comparison with foreign countries, and I am obliged, therefore, to limit the comparison to "cotton fabrics," for the which I have obtained the following statements of the principal countries in Europe.

Countries.	No. of Factories.	No. of Spindles.	No. of persons employed
Austria	202	1,500,000	30,020
Bavaria	18	558,700	12,000
Belgium	169	600,000	12,000
France...	2,394	3,457,552	244,579
Prussia...	132	194,290	'5,201
Russia	70	1,400,000	50,000
Saxony	134	604,646	12,000
Switzerland...	132	1,112,625	20,000
The smaller States of Germany	30	440,000	8,000
	3,281	9,867,813	393,800
Great Britain and Ireland...	2,210	28,010,217	379,213

The above number of spindles, say in round numbers 10,000,000, are known to be in operation in certain countries in Europe, being those most engaged in industrial pursuits, and containing an aggregate population of 160,000,000. If to the remaining countries, containing a population of 55,000,000, we give 4,000,000 spindles, which is a very large estimate for Spain, Portugal, Italy, Turkey, Greece, Denmark, Holland, &c., it will be found that the continent of Europe gives employment to 14,000,000 spindles. To this number must be added the probable number in operation in America, which has been estimated not to exceed 7,000,000. There will then be a total of 21,000,000 out of England, tended by every variety of race, each with their different characteristics and habits, while in Great Britain alone there are 28,000,000, tended by industrious, intelligent, and steady operatives.

From a comparison of the Table just quoted with the first Table, the following results are obtained:—That in the United Kingdom there is one person employed in a cotton factory to every 72 of the population.

In Switzerland	One in every	100
France	,,	132
Saxony	,,	141
Prussia	,,	300
Belgium	,,	350
Bavaria	,,	416
The smaller States of Germany	,,	625
Austria	,,	1,313

And the size of the factories is shown by the following figures. The average number of spindles in a factory in the United Kingdom, is 12,600

France	1,500
Prussia	1,500
Belgium	4,000
Saxony	4,500
Austria	7,000
Switzerland	8,000
The smaller States of Germany	14,000
Russia	20,000
Bavaria	30,000

The larger proportion of spindles in the factories of Germany, Russia, and Bavaria, is owing to the very recent introduction of the factory system into those countries, and consequently to the erection in those countries of large spinning mills. For instance, there are only 18 cotton factories in Bavaria, but one of them contains 95,000 spindles and another 40,000, whereas in this kingdom the comparison is made with all classes and descriptions of factories, some built 70 or 80 years since, in which cotton undergoes some process or other of manufacture by power.

VALUE OF MANUFACTURED GOODS IN THE UNITED KINGDOM, AUSTRIA, AND FRANCE.

In the spring of last year, I made, for the International Statistical Congress, some calculations of the amount of capital invested in the factories of this country, and of the value of the manufactured goods produced in the year 1856. From these calculations it appeared that £55,000,000 worth of cotton goods were manufactured, of which £17,000,000 worth were consumed in this country, which is at the rate of about 12s. per head. This is, perhaps, a moderate estimate, for the consumption of cotton goods in 1859 has been calculated by Mr. Bazley, M.P., at £23,000,000, or 15s. 5d. per head per annum. This latter sum, however, represents the whole value of cotton spun and manufactured, divided by the population, but the calculation I had made was the value of cotton goods consumed as cotton goods annually in this country. A large quantity of cotton is used for warps in combination with wool and worsted, and these goods are commonly classed as woollen and worsted fabrics, and the value of the cotton used in them is included in their general value. Cotton is also used in a variety of ways with the other filaments, and, in fact, enters into every species of textile manufacture, so that my calculation of £17,000,000 of cotton wares consumed, may be considered as a fair, though perhaps a moderate, estimate.

The following shows the value of the various textile fabrics manufactured in this country in 1856:—

	Estimated value of goods manufactured.	Quantity exported.	Estimated quantity consumed in this country.
	£	£	£
Cotton	55,298,778	38,283,770	17,015,008
Wool	23,942,976	5,985,744	17,975,232
Worsted	12,715,569	6,415,569	6,300,000
Flax	15,100,000	6,262,588	8,837,412
Silk	18,900,000	2,966,938	15,933,062
Total	125,957,323	59,914,609	66,060,714

The average annual consumption in this country is as follows:—

	£	s.	d.	
Cotton Goods..................	£0	11	11	per head.
Woollen ,, ...	0	12	7	,,
Worsted ,, ...	0	4	5	,,
Flax, &c. ,, ...	0	6	$2\frac{1}{4}$	,,
Silk ,, ...	0	11	$1\frac{3}{4}$	,,
	£2	6	3	

Very full accounts have been published by the Austrian Government, giving detailed statements of the several textile industries of the empire, and they will enable us to contrast the operations of the Austrian with our own factories.

In Austria about 400,000 persons are engaged upon cotton, of whom probably 300,000 are hand-loom weavers, and they produce goods to the value of £8,000,000, which are consumed at home, and average 4s. 7d. per head.

The value of the woollen goods was £6,000,000, or 3s. 4d. per head.

The linen manufacture of Austria is said to give employment to 3,500,000 persons, the larger portion of whom are hand-spinners, only 100,000 spindles being contained in factories. They produced goods to the value of £6,000,000, being at the rate of 3s. 4d. per head.

In the silk industry 800,000 are employed, and produce goods to the value of £5,000,000, or at the rate of 2s. 10d. per head.

The case of the United Kingdom and Austria stands thus:—

The former, with 750,000 cotton workers, produced £55,000,000 worth of goods, or each worker produced to the value of £73; the latter produced £8,000,000, of which each worker produced £20 worth.

The former produced woollen and worsted goods to the value of £36,656,545; the latter produced similar goods to the value of £6,000,000.

The former, with 290,731 persons engaged in the flax and linen trade, produced goods to the value of £15,100,000, or each worker produced goods to the value of £51; the latter with 3,500,000 workers, produced goods to the value of £6,000,000, of which the workers produced 34s. worth each.

The former, with 139,235 persons engaged in the silk manufacture, produced goods to the value of £18,900,000, of which each worker produced £136; the latter with 800,000 workers upon silk, produced goods to the value of £5,000,000, of which each worker produced £6 worth.

The textile fabrics produced in the United Kingdom, with a population of 27,000,000, were valued at £125,000,000, while in Austria, with a population of 35,000,000, they amounted only to £25,000,000.

The relative quantities consumed per head are as follows:—

	The United Kingdom.			Austria.		
	£	s.	d.	£	s.	d.
Cotton goods ...	0	11	11	0	4	7
Woollen	0	12	7	0	3	4
Worsted	0	4	5			
Flax	0	6	$2\frac{1}{4}$	0	3	4
Silk	0	11	$1\frac{3}{4}$	0	2	10
	£2	6	3	£0	14	1

It is a pity that a similar comparison cannot be made with the other countries, of which some particulars are given in the table, in order that the manufacturing capacity of this country might be tested with that of Prussia and Saxony, for instance, who are our rivals in the production of some classes of fabrics. We are likely, however, to press our claims now for some share in the supply of textile fabrics in France. Before the recent treaty our fine cotton yarn was indispensable in France for the manufacture of lace, and consequently it was admitted, while coarser yarns were prohibited, and it cannot be doubted that the superiority of our cotton goods, taking into consideration quality with cheapness, must, before long, commend them to the French people, who now pay dearly for cotton goods because they are compelled to consume home

produce, of which their consumption, however, does not much exceed that which we have found to be the outlay of the Austrians. The following value of the French manufactures is taken from Mr. McCulloch's Dictionary, who states that it is more moderate than most of such statements, which are generally apt to be exaggerated.

The value of Cotton goods was	... ...	£9,000,000
,, Woollen ,,	... ...	10,600,000
,, Linen ,,	.. ...	10,400,000
,, Silk ,,	... ...	12,000,000
		£42,000,000

The United Kingdom with a population of 27,000,000, produced goods to the value of £125,000,000, while France, with 34,000,000 of inhabitants, produced only £42,000,000 of the same kinds. The proportion of goods consumed per head in France would be as follows:—

	£	s.	d.
Cotton goods	0	5	3
Woollen and worsted ...	0	6	3
Linen, &c.	0	6	1
Silk	0	7	0
	£1	4	7

It is not, perhaps, necessary to pursue these comparisons further. As far as they go, they prove that in our cotton factories is embarked more than one half of the capital embarked in similar establishments in the whole world. They prove that the industrious populations of Austria and France produce in comparison only one-fifth, and one-third of the quantity of cotton goods produced at home, or if allowance be made for the difference of the population of the three countries, Austria produces only one-sixth, and France one-fourth of the cotton produced in this country. They prove that our population can afford twice and three times the amount of clothing indulged in by the Austrians and French, and they prove also, that while we not only clothe ourselves with comparative luxury, we send to every part of the globe, and we will send to them if they will admit them, as many of our moderately priced comforts and luxuries of clothing as they may require, and thus we may help to raise the comforts of our neighbours to a degree of equality with our own.

Advantages of the United Kingdom as a Manufacturing Country.

The rapid extension of manufacturing by motive machinery in this country, gave to manufacturers a start in the race of commerce which has been held for some time. The power to import English machinery, and the vigour of our manufacturers, have not been thrown away upon foreign manufacturers. We see the factory system developing itself more and more abroad. The hand-loom is being supplanted by the power-loom, and each country has exhibited a desire to supply their own looms with native spun yarn. Hence has arisen an anxiety among manufacturers that the universality of our commerce is threatened with a serious inroad, and it has been stated that foreign goods have been exhibited in this country at a price which it is considered will affect the prices of similar goods manufactured in England. I believe, however, that none but an occasional inroad upon our supremacy as manufacturers need be apprehended. In the first place, it is not probable that the number of working hours in this country will be reduced below their maximum at the present time, viz., sixty hours per week. Now, in all foreign countries there is a continual pressure for the reduction of their long hours of work. In Prussia there is a factory act, for limiting the hours of labour, partially in operation, which will doubtless be pressed on as the manufacturers become accustomed to its restrictions. In France, there is a Factory Act, which could be put in force at any moment by the Government, although it is actually in operation only in the Department du Nord. In Austria, Belgium, Saxony, &c., there are some general laws affecting the education of children when employed in factories, but practically the hours of labour are unlimited. In Russia, I believe the government is contemplating the introduction of factory regulations.

I go as far as any one can do in relying upon the principle of non-intervention, whether of politics or of trade. I agree that to limit the hours of labour is an interference with rights, which nothing but an overwhelming necessity can justify; and herein do I think that the interference in factories is clearly justifiable. It has been said, and we know how true it is, that God tempers the wind to the shorn lamb, and in a like spirit has the Creator ordained seasons and changes which temper the hardships of life to him whose daily bread is earned by the sweat of his brow. No one has ever proposed to lessen the hours of labour of the agriculturist—no one has, upon medical or sanitary grounds, ever proposed to restrict the hours of labour of men pursuing mechanical employments in the open air, because Nature herself has provided changes of season and varieties of temperature—the inexorable laws of nature, which do, in fact, relieve and shorten the labours of the workman in fields, upon stone, iron, and the like. He may labour long in the warm sun; moreover, he may earn more than he requires for his daily wants, but that labour cannot be continued throughout the year; the cold and the early night of winter stay his plodding hand; his work commences at a deferred hour and ceases early; his frame has the opportunity of becoming invigorated and fitted for the coming toil of the ensuing summer; but not so the "factory hands;" their daily work depended not upon the light of the sun, or the warmth of its rays—their labour was not limited to the sun rising and sun setting of winter. That light which, as we are told by the philosophers, was imbibed from the sun, and has been for ages undergoing hidden chemical changes in the bosom of the earth, is now, by the application of heat, released from its bondage, and illumines the dim hours of night and diffuses the warmth of the day. Hence, light and warmth, denied to us by nature in winter, are generated within the walls of a factory by art, and the factory hands, bound to their iron master which requires constant and unremitting attention, did, with tired fingers and toiling steps, follow each revolving thread, until the power ceased to revolve; and the master, having at his command light and warmth, became independent of the fading light of the sun, or the chill pinching of the air, for he could supply light and warmth day and night throughout the year.

Without the passing by the legislature of a penal enactment for restricting the labour of children, young persons, and women to a healthy duration, it would have been impossible for manufacturers to have lessened, by voluntary agreement, the hours of work of their establishments. Most of us are actuated by the best intentions, but we cannot always be just unless we know that our neighbour is so likewise, and that if he attempt to diverge from an honourable course, he will be compelled to retrace his steps.

With much that there may be to deplore in the present condition of the working classes, and with much that may need amendment—this meed of praise cannot be denied to them, that they have not abused the opportunities which the factory regulations have secured to them. Politically, morally, and socially, the manufacturing districts are daily and hourly advancing. No one who mingles with the workers in factories, whether of textile fabrics or metals, can fail to observe the intelligence of a large number and the well-informed minds of many, and to those who, like myself, labour in their midst and for their welfare, it is no slight happiness to be able to feel this, and to mark that their social and moral progress is sure, although it may be gradual, and that manufacturers themselves approve the law, support the administration of it, and bear witness to its efficiency in having banished many evils which formerly abounded in the factory districts.

Thus, in England, we have already restricted the hours of work to a moderate and generally approved limit, while in no foreign country has a general law been applied, although in some, manufacturers are being prepared for factory regulations, and in others, doubtless, they will be introduced at no distant period.

Again, turning to the difference in character between the British and foreign artisan, there is a clear and marked difference in their mode of working. The Englishman steady, active, persevering, and attentive to his work, keeping pace with improvements, adapting himself readily to altered circumstances, seconding the increasing exertions of the iron man, not overworked by an English factory day, 10½ hours, answers to all the exertion that is demanded of him by increased speed or varied processes in a factory. While his foreign competitor, already fatigued by his 12 or 14 hours of daily work, is not in a condition, if he had the natural disposition, to expend an increased amount of daily exertion upon more complicated machinery, or by reason of increased speed of spindles and shuttles; he is less active, less attentive, and less steady in his work than the English operative. In 1853, after a visit to some of the chief manufacturing establishments in Prussia, I stated the result of my observations as follows:—

"Comparing the amount of work that can be turned out by an English operative, the skill and intelligence with which he performs his work, and his capability of adapting himself readily to mechanical improvements, it was admitted by every manufacturer to whom I spoke upon the subject that with the sole advantage of cheapness of labour they could not compete with English manufacturers, and they feared the recent restrictions of labour in Prussia would affect the power of production, for the Prussian factory operative labours at least ten hours per week more than his English competitor, and if employed at the loom in his own house his labour is not restricted even to those additional hours."

And again, in 1855, after visiting some of the French establishments at Rheims, Rouen, Lille, Roubaix, &c., I was satisfied that Englishmen and English factories had nothing to fear in comparison with our neighbours, and to draw the comparison closer, which I am able to do by referring to the details of some large cotton spinning mills, both in this country and abroad, I find that in the largest spinning factories in Austria the proportion of persons employed to spindles has not reached so high as one person to 90 spindles, except in one case, viz., a factory in Bohemia, containing one machine numbering 144 spindles, minded by one man.

In Bavaria, the cotton spinning trade is of recent introduction, and the factories are described as well built and containing excellent machinery; yet I find, in two of the principal establishments, one of 95,000 spindles, and 1,200 hands, the other of 46,000 spindles, and 600 hands, that the proportion of persons employed to spindles is in one case 1 to 90, in the other, 1 to 80.

That I have not overrated the superiority of the English operative, as a workman capable of getting through his work in a manner very much superior to the foreign artisan, I may refer to the table of the number of spindles and of persons employed in foreign cotton manufactories. The comparison which I propose to make is perhaps not strictly accurate as representing what an English spinner can do, and what a foreigner can perform, but it is generally correct as showing the number of spindles compared with the number of persons in the same factory. The average is as follows:

In France one person to ...	14 spindles
Russia ,, ...	28 ,,
Prussia ,, ...	37 ,,
Bavaria ,, ...	46 ,,
Austria ,, ...	49 ,,
Belgium ,, ...	50 ,,
Saxony ,, ...	50 ,,
Switzerland ,, ...	55 ,,
The Small States of Germany	55 ,,
In the United Kingdom ...	74 ,,

But referring to the principal cotton spinning factories of my own district, I find that the proportion in the cotton spinning factories of Lancashire, in 1856, was 1 person to 180 spindles. This does not mean that one person was employed in minding only 180 spindles, but that the proportion of persons of all classes in the whole of the spinning factories in Lancashire was 1 in 180. I do not know the size of the spinning mules abroad, but in this country it is not uncommon for a man and two assistants to mind 2,200 and 2,400 spindles. Contrast the painful efforts of the old spinner, laboriously turning his wheel with one hand, and with the other producing the solitary thread, with the three well-paid operatives, producing 2,400 threads at once, and turning off daily 220 lbs. of yarn, measuring 400 miles in length.

Then as regards the raw material, I believe the advantage will always remain with this country, from our superiority as merchant carriers, from the command of capital for improvements in the transport of produce, and from the immense quantity consumed in this country, which will give our market the preference.

It is generally believed that the capital required for the building, plant, and working of a factory in this country, is considerably more than would be required abroad. I am not able to offer an opinion upon this point. The sum required for the erection and machinery of a cotton factory has been so variously estimated, that it is difficult to arrive at a correct result. It has been usual to calculate the expense at so much per spindle; and this estimate varies from 13s. 6d. to 26s. 6d. per spindle; but in Austria it is stated that the average estimate is 12 florins, or £1 per spindle; and in Bavaria, the estimate of the two factories to which I have already referred, more than £1 per spindle; but I am firmly persuaded that our freedom from fiscal and police restraints gives so great an advantage to our manufacturers as to compensate for a greater outlay of capital in buildings and machinery.

The Highest Qualities attainable by British Manufacturers.

It has often been urged, rather as a slur upon the manufacturers of this country, that whether in textile fabrics, metal, clay, or other work, we fail in the colour, form, and taste of our productions; that the porcelains of Dresden and Sèvres are the productions of nations of high artistic intelligence; that the silks and cambrics of France exhibit the highest appreciation of colour and texture; that the muslins and shawls of India are unapproached in beauty by the choicest specimens of our looms, and our inferiority is denounced as a discredit to us. But let us consider for a moment. The porcelain of Sèvres, the silks and cambrics of France, do exhibit some of the most beautiful qualities which are sought in such articles: but what called them forth? The aristocracy of France, the courtiers of the Henrys and of the Louis, revelling in all the luxuries that wealth, wrung from the middle and lower classes, could bring, demanded beauty of form, excellence in colour and delicacy in texture. We know that the sturdy burghers of the Low Countries wrought out for themselves some freedom of action and thought, and procured for their guilds some portion of political influence, and they produced, not only luxuries for the wealthy and powerful, but plainer wares for the middle classes, for the humble and poor. In France there was no such middle class to push onward and to force upon those above them a recognition of their position and influence. All power was in the hands of an aristocracy and of a court of exclusive *régime*, whose will, whose whims, whose tastes led the sentiment of the country. The gratification of their wishes was the highest object to be attained by the trader, the greatest emolument was to be obtained by producing the most exquisite wares for the admiration of the great. We see this exemplified in a marvellous degree in the pottery of the countries which boast, and honourably so, of the beautiful and elaborate productions of Dresden and Sèvres. The earthenware in

use for domestic purposes is of the commonest and meanest kind; it is coarse in material, ugly in shape, heavy and unpleasant to be used. Compare with it the common pottery in England, which is cheap, handy in make, and very frequently good in design and colour. In this country the aim of manufacturers has been to produce wares for the middle classes, good and reasonable in price, and they have succeeded. That they can also send from their workshops productions scarcely inferior to those of Dresden and Sèvres, the names of Minton, of Copeland, and of others will testify. Let us take as another extreme case the muslins of India. The beauty, softness, and delicacy of these fabrics have long been celebrated. We are accustomed to think of them with wonder, and to despise somewhat their coarser but cheaper rivals of Manchester and Glasgow. But these exquisite productions have been created in satisfaction of the law of supply and demand. The rajahs and princes of India, swathed in riches and steeped in luxurious pleasures, require in their enervating climate the softest and most delicate tissues for themselves as well as for their Zenana. The use of the very finest muslins was restricted to members of a royal house. In a country which contained two prominent classes — princes and peasants—the former would naturally prevail, and we find throughout India that there has been a demand for the choicest and most beautiful specimens of manufacturing art, for the gratification of the powerful and the rich. The chief thought of the dependent has been to produce the most luxurious and most exquisite fabric for the prince and his favourites. The intelligence and dexterity of the spinner and weaver are taxed to the utmost stretch to supply their wish or to anticipate their wants, and the reward was frequently as lavish as it was generous; and in proof of the estimation in which the art of weaving was held, I may mention that the Hindoo weaver ranked above all other mechanics, and next below the scribe. The delicacy and fineness of the Dacca muslins are not easy to describe. In the imaginative language of the East, they have been called "webs of woven wind;" and it has been stated that when laid upon the grass to be bleached, and the dew is upon it, it cannot be discerned. That this latter description is not overdrawn, we may gather from a circumstance which is related to have taken place at the court of Arungzebe. He is said to have chidden his daughter for appearing before him too thinly clad, when she replied to him that she was clothed in nine folds of raiment. She might have added that her garment contained a filament of cotton which, if produced would measure upwards of forty miles. And a Persian ambassador, upon returning from India to his own country, is said to have presented his Sovereign with a cocoa-nut containing a piece of India muslin for a turban 30 yards in length, which, when expanded in the air, could hardly be felt.

These appear to be marvels, but I believe them to be honestly true. Reckoning the dress of the daughter of Arungzebe as containing 20 square yards, and that four miles of yarn could be spun by an expert spinner in India from 180 grains of cotton, her dress would weigh about four ounces, and contain forty miles of yarn; and then, calculating according to the English method of determining the fineness, or, as it is technically called, the counts, or numbers, of yarn, by reckoning so many hanks or skeins, of 840 yards each skein, to a lb. weight, it would appear that her dress was made of about 320's, *i.e.*, 320 hanks of cotton yarn, each measuring 840 yards = 160 miles of yarn, which would weigh 1lb. But to spin 300's is no marvel in this country; 700's are constantly spun for the manufacture of lace, *i.e.*, a pound of yarn of that degree of fineness will measure upwards of 334 miles in length. The Messrs. Thos. Houldsworth and Co., of Manchester, who, I believe, spin the finest yarn in this country, spun for the Great Exhibition of 1851 specimens in short lengths of 2,150's = 1,026 miles to the pound weight, and the estimate is that the fibre of the raw cotton from which this yarn was spun would average 8,000's, *i.e.*, it would require 8,000 hanks of a single fibre of the raw cotton, each hank measuring 840 yards, to weigh one pound. It may be true that the delicate fingers and sensitive organism of the Hindoo girl may enable her to manipulate the fibre of the cotton in spinning, with a certain degree of elasticity of which the spinning machine is incapable, but in the one quality of degree of fineness, we compete successfully with the Hindoo. And in weaving with the hand-thrown shuttle, the Hindoo weaver may, by practice, give to his muslin some qualities not at present attained by the power loom, but muslins were exhibited at the Great Exhibition of 1851 of No. 540's yarn; and I believe yarn of No. 700, spun by Messrs. Houldsworth, has been woven into a dress for Her Majesty, and these are proofs of our progress also in the art of weaving in competition with the Indian loom. Had the demand existed in this country of sudden changes of temperature, for muslins of almost super-human fineness of texture, could it be doubted but that the demand would have been supplied by our energetic and highly intelligent manufacturers, and that such goods would have obtained a preference in the markets of the world. As I said before, our manufacturers supply that which is most in demand. The reigning favourite of Delhi or of Oude may sigh for a robe made of the "web of the woven wind," but in this country the thrifty housekeeper, whose name is Legion, demands Horrock's long cloth for shirting, Irish union for sheeting, and Scotch cambric for economic use.

ECONOMY OF MATERIAL AND IMPROVED PROCESSES.

Within a very few years the economy of the factory has been greatly improved in this country. There are the improvements in machinery, the whole of which have for their object the substitution of the iron frame for the human hand. There is increasing economy in the use of materials, the utilisation of waste substances, and the re-manufacture of old materials. The breaking up of existing machinery, and the substitution of new, is a marked feature in the present era of manufactures. I scarcely spend a day among the cotton factories of Lancashire that I do not find in one or more either lengthening of spinning machines, re-distribution of preparatory processes, or introduction of new machinery. At one of my recent visits to a cotton factory the intelligent proprietor referred to a room in which he had had new machinery within the last two years, and he was about to replace it with new, which would require one hand less to tend it and would produce one-fourth more work. The cost of the alteration would be covered in less than a year. A remarkable instance of the economy of labour is to be found in the substitution of cylinder-printing of calicoes, &c., for block-printing, by which one man and one boy do the work of one hundred men and one hundred boys; and this mode of printing has been brought to such perfection that ten colours can now be printed at once. Another instance of the remarkable advance of improvement came under my notice still more recently. Some new machinery was pointed out to me in a newly-built factory, of such remarkable self-acting power that I have obtained from the proprietor the following particulars in respect to it:—

The process is for preparing wool up to the spinning.

The plan in general use a few years since, for the same amount of work as performed by the new machinery, required the following hands:—

18	men.
45	young persons or women.
63	

The proprietor then introduced a better plan, which required—

18	men.
15	young persons or women.
33	

The last improvements enable him to dispense with more than one-half of the above number, and chiefly those receiving the higher wages. He employs in his new mill:—

4 men and
9 young persons or women.
—
13
—

But with this new preparatory machinery he has put up improved spinning machines, and here, again, he dispenses with the labour of six men, and nine young persons and women, out of 44 persons, so that instead of employing 33 men and 74 young persons and women, he only employs 13 men and 29 women and young persons. These improvements have been chiefly caused by the scarcity of labour. The woollen hand-loom, of which there has been a large number, is being rapidly replaced by the power-loom, and chiefly because of the diminished quantity of adult male labour; and in the cotton districts there has been for some time a considerable deficiency, and we may look for continued improvements in manufacturing processes, which will be necessary to meet the increasing demand for textile fabrics, but these innovations are not always against the interest of the operative. If a manufacturer cannot find hands sufficient for his factory, and I know many whose complement is never filled, they must replace, if possible, their old machinery with that which performs more work with less human aid, and it does not follow that the price of human labour is diminished as a consequence of these alterations, for we have seen at Nottingham, especially, where the old stocking frames have been succeeded by what are called roundabouts, and rotary frames moved by steam-power, that the stocking weaver is able to earn very considerably more at these new frames, which have reduced the price of at least one half of certain classes of hosiery, than he could at the old stocking frame.

There is, doubtless, greater care in the use of the various substances requisite in the operations of a factory than formerly, but there is still room for greater economy. For instance, the consumption of grease and oil is no small item in the current expenses of a factory, but it has been used with a careless waste, covering the floors with grease, which accumulates, and the dirt sometimes forms a thick uneven crust over the whole factory; but the use of self-feeding apparatus, and of cans for delivering the exact quantity of oil required by each spindle and wheel, has tended greatly to economise the use of an expensive material, and to render the rooms clean and healthy. I am assured that a saving of one-fifth of oil might be effected by a careful lubrication of the machinery. The adoption of cleanliness, and of improved methods of ventilation, I conceive to be most important elements in the economic use of the material "man." A well ventilated room, clean floors, as well as walls, and proper change of air, will enable a man to work with more vigour and attention than if he were confined in a room, close, ill-ventilated, and reeking of grease and dust.

There are several factories in my district in which all these improvements have been carried out in a liberal and discriminating spirit. I can bear testimony to the cheerful and healthy condition of the persons employed, while I am assured by the proprietors that in promoting all these plans for the physical amelioration and comfort of their hands, they consider as manufacturers that their work is better and more expeditiously done.

It has been well said by Lord Palmerston, that dirt is only to be condemned when it is in the wrong place. Now, a factory is certainly not the place for the accumulation of dirt, nor is the stream which flows in its vicinity the proper place for its reception. All offensive and dirty matters used to be freely discharged into the nearest stream, but now the dirty and greasy washings of factories, and herein I allude chiefly to woollen and worsted factories, are conducted to a tank, and by a very simple process the watery particles are discharged, and the residuum is re-converted into a fatty substance, largely used for candles and the manufacture of soap. In one establishment alone I am assured that a profit of £800 a year, after paying a rent of £200 to some neighbouring factories for their refuse, is made by this conversion to useful purposes of the dirt which formerly polluted the stream and neighbourhood.

It has been found that old materials form very good substitutes for new. The bits of raw cotton which do not pass through the machines, the ends of rovings and yarn, the flaws, which are broken off, are all carefully preserved, and undergo several modes of preparation by which they become serviceable for various purposes. It is the same with wool, with flax and with silk—but the chief utilisation of old materials is in the manufacture of new coats out of old. A Polish Jew, or an Italian beggar, is generally considered one of the dirtiest objects with which we can come in contact, yet it is not impossible that some of us may, at this moment, happily unconscious of our fate, be wearing some portion of the cast-off habiliments of a Polish Jew. Coats, trowsers, &c., after having been well worn in this country are shipped off for the German ports, and after having been distributed where most in request, and thoroughly used up as garments, they return to us as woollen rags. They are sorted into qualities, and they then go through a machine called a devil, which tears up the bits of cloth and delivers them out as wool, which undergoes again the various processes of carding, spinning, &c., and being mixed with new wool, again becomes cloth.

It is calculated that at least 45,000,000 lbs. of woollen rags are annually consumed, which is about one-fifth of the whole of the material, new or old, now used in the manufacture of woollen cloth. Twenty-five years ago the price of the best woollen rags averaged about £4 4s. per ton, but the present demand for them has raised that price to £44 per ton. When these rags were first introduced, and for some years afterwards, they were only of use if they contained nothing but wool originally. But the demand became so pressing, that the rags of fabrics made of cotton and wool, and of cotton and worsted, are no longer rejected. They undergo a process called "extraction," by which the cotton is destroyed, and the woollen fibre is preserved and utilised. Although rags are very generally used in woollen factories, they are principally manufactured at Dewsbury, Batley, and the neighbourhood near Leeds, in which it is estimated that from 7,000,000 to 8,000,000 of yards of cloth are annually manufactured, of the value of £1,500,000.

CONCLUSION.

I have thus endeavoured, but I feel with indifferent success, to point out a few of the incidents in the manufacturing of textile fabrics in this country. It may be truly said that we clothe the whole world, for we export annually, of calico and woven cotton goods alone, sufficient to make an under garment for every man, woman, and child in the universe. The cotton yarn annually spun in this country, reckoning it to be of an average size, would reach 600,000 times round the earth, and our looms produce annually 3,000,000,000 of yards of calico.

The cotton factories contain one-half of the cotton spindles of the rest of the world, and can produce cotton better and cheaper than in any other country. They spin daily 50,000,000 of miles of yarn, from which our looms weave daily 10,000,000 yards of calico or other goods.

Can it be wondered at that there is a party of politicians called the "Manchester School." It is common for us to condemn those who seek to maintain class interests, but do not all endeavour to support their own class? the army and navy—landowners—coal-owners—ironmasters, all keep their own interests before them. The manufacturers do the same. They have wealth, they have intelligence, and the 6,000 or 7,000 masters have the responsibility of being in the aggregate the mainstay of nearly one-fifth of the population of the country. Let it be con-

sidered to what infinite ramifications the effects of short time are felt, and felt most by those who receive the lowest rate of remuneration, and who are the least provident of all, and the weight of the responsibility of these manufacturers will be seen to be no light one, and fairly may they maintain, with no selfish views, that it is the duty of a government to secure "the greatest amount of happiness for the greatest number."

DISCUSSION.

The Chairman would now invite discussion upon a paper which he was sure they would agree possessed no common interest, and was marked by no common ability. The history of the factory system of Great Britain included probably a larger number of elements of interest and importance than could be compressed into any one subject brought before a public audience. Its growth, its present extent, its influence upon the social condition of the people, and on the wealth and power of the State, all rendered it a subject of the utmost importance to Englishmen. He thought Mr. Redgrave had introduced this important topic in a spirit which must be highly approved of; there had been nothing of exaggeration and nothing of depreciation. He specially desired to express his obligations to Mr. Redgrave for having done justice to the intelligence of the working classes of this country. We were sometimes disposed to estimate higher than they deserved the qualities of the artisans of other countries, and it was satisfactory to be assured, from the distinct and definite data which Mr. Redgrave had brought before them, that in every point of comparison the artisan of Great Britain contrasted favourably with the artisan of every other country. He would now invite his friends around him to add to the interest of the paper by discussing those questions which it fairly opened. He had the pleasure of seeing present a gentleman who had been the historian of the cotton manufactures of Great Britain and of the varied interests which were involved in them, and he hoped that gentleman would do them the favour of contributing to the interest of the discussion by some observations.

Mr. E. Baines, M.P., said he had listened with pleasure to the very interesting paper of Mr. Redgrave. It was a great advantage to have gentlemen like Mr. Redgrave in the situation which he filled, with their eyes open to all that was passing before them in this country, and ready to collect information from other countries and compare it with the state of things in our own. As far as he (Mr. Baines) was able to judge, there had been no exaggeration or depreciation in his paper. He had himself taken some pains with the statistics of the cotton and woollen manufactures at different times, and he generally agreed with Mr. Redgrave's results, only that gentleman had brought down his information to a more recent date—at least with regard to the cotton manufactures—than he (Mr. Baines) had done. It seemed to him that the facts stated by Mr. Redgrave might be implicitly relied upon, and it was not a common thing to have statistics of a very complicated subject brought out without exaggeration or error. He believed these statistics were as correct as anything that could be had at the present day. There was one observation he might make with regard to the way in which cotton was extending itself into all other textile manufactures and mixing with them. Formerly, the opinion prevailed very generally in this country that cotton, being a comparatively cheap commodity, its introduction into other fabrics was injurious to their quality; but now cotton was indispensable to our woollen and worsted manufactures, and, to a considerable extent, to our silk and linen manufactures. It was introduced to an enormous extent both in the worsted and woollen trades. The manufactures of Bradford were founded very much upon the mixture of cotton with worsted. Thus were made light and beautiful fabrics, different from the old heavy worsted materials. Cotton was now introduced in a variety of ways, amongst others into the mousselines-de-laine, and when used with a certain quantity of worsted was found to produce a valuable fabric. It was the same with regard to woollen goods. He recollected the time when woollen cloth, with cotton warp, was regarded as the most wretched thing in the world. Now it was found that cotton, when combined with an article called shoddy or mungo, produced the very thing that was wanted, and they had two cheap materials which by their combination made very respectable cloth. The shoddy was produced by tearing up old clothing and working it over again, but the fibre was so short that cloth made of shoddy alone was not strong, and was almost worthless, but by the introduction of cotton warp, which was peculiarly strong, with this material, which was light and warm, they produced a cheap and most serviceable article. This was illlustrative of the remark of Mr. Redgrave, that England manufactured for the million, and not for a few aristocratic families or classes. The several textile manufactures of this country had encreased at a most enormous rate between the years 1838 and 1856. Mr. Redgrave had given them the particulars of the latter year. He (Mr. Baines) had before him a paper which he prepared for the British Association, relative to the woollen manufactures between the years 1838 and 1856—a period of eighteen years; and it was interesting to observe the wonderful rapidity of their progress. The various manufactures in cotton wool, worsted, and silk employed, in 1838, 423,000 persons, while in 1856, the number was 682,000. These were in the factories alone. The horse-power employed had increased from 102,000 in 1838 to 161,000 in 1856. The number of power-looms in operation in 1838 was 115,000 and in 1856, 369,000. Cotton had the immense advantage of cheapness. It was to be hoped it would retain that advantage, and that we should not be deprived of our great supply of that important raw material by the events that were happening in other countries. It was of unspeakable value to have a raw material which was so cheap. If they compared the price of that material with that of our home product, namely, wool, it would be seen to account, in a great measure, for the rapid growth of our cotton manufactures. The price of cotton two years ago was, upon an average, 5¾d. per lb., whilst the price of wool was 1s. 4d. Flax was about 5d., or nearly the price of cotton, showing that the raw material of wool was three times the price of cotton, and whether it was English or foreign wool, the price of each was nearly the same. England was furnished with only one native raw material to any great extent; flax was only grown to a small extent. The growth of the raw material of wool was large. It was the old growth of the country, and as such it had been for a long period of years the subject of legislative enactment in the prohibition of the export of that article. He estimated the quantity of English wool produced at the present time at 175,000,000 lbs. per annum, whilst of foreign wool—from Australia and other colonies—the quantity amounted to about 140,000,000 lbs., of which a certain quantity was exported, so that we might be said to consume about 100,000,000 lbs. of foreign wool, and 160,000,000 lbs. of home-grown wool per annum. The increase of our woollen manufactures had been slower than that of the other manufactures. Cotton, worsted, flax, and silk, had all increased at a more rapid rate than the manufactures of wool. The reason for this, he believed, was not generally understood. The chief causes were—in the first place, the dearness of the raw material; and in the next place, it was the fact that wool could not be worked in factories by machinery so well as the other materials. In most other descriptions of manufactures the thread was spun rather hard, but it was not so with wool. This must be spun soft and loose, and thus it was a soft and feeble thread, which could not be so easily worked in power-looms, owing to the immense rapidity and consequent friction of the shuttle. It was the only material which "felted." It had that peculiar fibre which contracted upon the application of moisture and

warmth, and the fibres became interlaced and firmly united, so that a piece of cloth of sixty yards in length, when milled, would come out forty yards, whilst the width would be reduced by that process from nine feet to about four and a-half feet. That was what was called the felting process, and in order to allow of the felting, the material must be spun soft, and not as a hard yarn, like that produced in the factories of Manchester, or the hard worsted yarn which was spun in Bradford. It followed, therefore, that they could not subject this yarn to the power-loom to the same extent as they could the other descriptions of yarn. It must be, moreover, worked up for the most part by men and not by women and children. Hence the proportion of men employed in the woollen manufactures was larger than in every other textile manufacture. He quite agreed with Mr. Redgrave in the high opinion he had expressed of the efficiency of the English workman. There was an official inquiry made in France, about the year 1831, with regard to the relative position of the French and English manufacturers at that time; and the French manufacturers generally gave this opinion: they said the English workman possessed a combination of qualities not possessed by the workman of any other country. He had the combined qualities of the Norman and the Anglo-Saxon races—the activity and energy of the first, and the plodding perseverance of the other, and it was this combination of qualities in the English workman which made him superior in these manufactures to the workman of any other country. But he was not sure whether our descendants on the other side of the Atlantic did not excel us in these respects; for whilst it was the practice in Lancashire to have two power-looms under the charge of one girl, he had heard that in Massachusetts one girl had the charge of five or six looms. With regard to the question of taste in design, he to some extent concurred with Mr. Redgrave in his observations upon that point, for we in England had much to do yet in that direction. The contrast between the English and foreign portions of the Exhibition of 1851, and also of the Paris Exhibition in 1855, was very great in that respect, especially in the method of arranging the articles in the latter. It was distressing to see the melancholy appearance of the Leeds and Yorkshire goods in comparison with those of many parts of France. The arrangement and the mode in which the French goods were draped was very beautiful, whilst the Yorkshire goods were hung like towels over a rail. He hoped the Society of Arts, which had so nobly originated the approaching Exhibition in 1862, an event he anticipated with very great interest, would endeavour to give a stimulus to the improvement of our people in their taste and mode of arrangement. He would only add that he felt much indebted to the gentlemen connected with the Society of Arts for the determination with which they had pursued the great object of another exhibition. He was sure the last Great Exhibition was of immense advantage to us in respect of taste, and he anticipated admirable results in that direction from the Exhibition of 1862.

Mr. BAZLEY, M.P., like his hon. friend who had just addressed them, had great pleasure in bearing his testimony to the excellence of the paper they had heard that evening, in which the merits of the textile manufactures of the United Kingdom had been so ably dwelt upon. Well acquainted as he was with the general statistics of such trades, he confessed he was agreeably surprised by the valuable combination of facts which had been laid before them. He observed that Mr. Redgrave had spoken of the four great originators of the cotton industry of this country—Arkwright, Strutt, Hargreaves, and Crompton. Having been acquainted, when a boy, with Crompton, he begged to state that he had no hesitation in awarding to him the merit of the invention of the mule which had effected so great a revolution in our textile manufactures. He did not know a better authority upon the subject of our textile fabrics than his friend Mr. Baines, whose History of the Cotton Trade in this country had afforded such valuable information to the whole industrial community. He wished Mr. Redgrave had been in a position to have given them an estimate of the value and extent of the various textile industries at the present moment. His records only extended to a period of five years since, when, unquestionably, we had a most extensive trade in those branches of industry; but in the cotton trade, with which he was principally acquainted, he might without hesitation assert that the augmentation had not been less than twenty per cent. in extent and value during that period; indeed, he thought manufacturers had, in some instances, increased their productions to a dangerous extent, and such as they could not hope to maintain; for he could show that in some branches of textile industry the increase had been at the rate of ten per cent. per annum; which was confirmed, not only by the increased consumption of cotton during he last few years, but also from the information he had derived from engineers and machinists, and when they heard that at the present time there were 20,000,000 of spindles at work, there might be an apprehension in the minds of some persons, that the increase was growing beyond the legitimate demand. The paper they had been favoured with was replete with matters of interest, and was almost above all criticism; but in estimating the increase of our manufactures during the period he referred to, he should say, instead of the maximum extent of our textile manufactures being £125,000,000, they did not amount to less than £150,000,000 at the present time; and it was to be recollected that this great increase of production was not a question of mere money value, but was also an indication of the increased comforts enjoyed by the great family of mankind. There were consumed last year, 1,000 billions of lbs. of cotton. The great varieties of manufactures into which that article entered, he could not attempt to describe. The fancy goods in which cotton was combined were too numerous to mention. There was one interesting fact, worthy of notice in connection with the profitable disposal of the waste of the cotton factories, which was formerly thrown away. At least 75 per cent. of the superior descriptions of paper was made from the waste of the cotton mills, which was collected and carried away daily. When these large quantities of oily substances were allowed to accumulate in the factories, as was formerly the case, there was great danger of fire from spontaneous combustion, and fires were formerly far more frequent. Cotton was known to be a great element, not only of comfort but of health. Its absorbent qualities were greater than those of linen, and cotton shirting and sheeting were very rapidly displacing the linen fabrics. He did not wish to see any rivalry between the two manufactures, but there could be no doubt that the growing intelligence of the people would surmount all prejudices, and cotton would be more largely consumed than ever. It was his wish to look encouragingly upon the supply of the raw material. His friend Mr. Baines had alluded to the embarrassments that might arise from the present state of feeling in America. The United States had lost their unity; they were now severed. Whether there would be any displacement of the industry of that country, and whether at the moment we required an increase we might be left with a diminished supply of cotton, was an event which experience alone could determine; but he would say that it was far from desirable that our main supply of so important a commodity should depend chiefly upon one source, and this was far from creditable to the enterprise and energy of a country possessing such a colonial empire as England boasted of. We had received this year no less than 85 per cent. of our raw material of cotton from the United States of America; eight per cent. from other foreign sources; and only seven per cent. had been received from the British colonies. No less than 85 per cent. of the supply was derived from coerced and oppressed labour, which they would like to see as free as their own. It was a remarkable fact that our colonial possessions contained a greater extent of land capable of supplying this material

than any other countries upon the face of the earth. Indeed, the amount of land required was not considerable, as a region equal in extent to Yorkshire would alone supply the cotton we required if the climate were suitable. A short time ago he received a communication from Sir Charles Bowen, Governor of Queensland, Australia, in which he stated that there was in that district land, exceeding the area of the whole of France, capable of producing beautiful cotton, that area being not less than from sixty to seventy millions of acres, whilst Yorkshire contained only about four millions. From that colony they had already received cotton of the most excellent quality, and of a fibre superior to that grown in America. Then again, a wide field for the growth of cotton was presented in our East Indian possessions. At the Exhibition of 1851, Mr. Houldsworth and himself were permitted to examine some of the samples of East Indian cotton, and at the same time some of the muslin of that country was placed before them. As had been stated by Mr. Redgrave, that fabric had been made from about No. 320-yarn; but both Mr. Houldsworth and himself had spun much finer than that. Six or seven years ago he was able to buy a few bags of very fine Australian cotton in Liverpool, and he found the quality was so beautiful and so admirably adapted for the production of exceedingly fine yarn, that he spun some No. 600-yarn from it, which was only about half the thickness of the fabulously fine yarn of India. It was, in fact, so fine, that the weavers of Paisley could not work it. He therefore sent it to a correspondent in Calcutta, by whom it was forwarded to Dacca, where it was woven, and it was sent back to him as one of the most beautiful muslins he had ever seen, and he had the pleasure of sending a contribution of that muslin to the Paris Exhibition. Reverting to the great natural resources and capabilities of India for the production of cotton, Mr. Bazley expressed his anxious desire to see the energies of his countrymen directed to that object. Some persons doubted the capabilities of India as a large cotton producing country, but there were ample evidences that it was so. He had bought Indian cotton at from 6d. to 9d. per lb., whilst the average price of United States cotton was from 6½d. to 7d. per lb., so that it was clear they had only to get a larger supply from India to find a ready market in this country. Hitherto, the complaint with regard to the cotton from India, had been that it was not sent to market with sufficient cleanliness; that it was badly packed, and badly got up. But the truth was it was not, as a general rule, *grown* of the quality that was required, and, therefore, it was not so useful as it otherwise would be. Last year they received from India a supply of no less than 600,000 bags, or equal to a consumption of 12,000 bags weekly; but the whole consumption of Indian cotton in this country during the last year was only 3,300 bags. What became of the rest? It was shipped to various places on the continent of Europe, where it could be used with greater economy than in this country. Mr. Baines had asked the question how many power-looms were appropriated to the attendance of one person in Lancashire. He believed there were cases in which one person had charge of six looms; but four or five was the average number, and he could state that young women in Lancashire were earning as much as 20s. per week from the excellence of the work given to them. Labour on the continent being much cheaper than in England, the inferior descriptions of cotton could be worked there with greater advantage; and it had been known to be the case that workpeople here had refused to work on account of the inferiority of the material offered to them. Under these circumstances it was clear that India ought to produce better cotton, for two reasons. In the first place, because it would pay the ryots better, and in the next place, the manufacturers required a better quality, and by that means both the producer and the consumer would be mutually benefited. Mr. Bazley proceeded further to point out the advantages of India as a cotton-producing country; but the present great want of that country was the proper means of communication, for which they must look not merely to the system of railways already in progress, but to the improvement of the canals and rivers in the interior, by means of which the system of irrigation could also be very materially advanced. In conclusion, he would say he hoped the result of public attention having been called to this important subject by such a man as Mr. Redgrave, would give an impulse to national exertion which would lead to those benefits of which he (Mr. Bazley) had been the humble advocate on the present occasion.

Mr. John Dillon remarked, that having attended that evening in the capacity of a learner, his own experience being chiefly in the silk trade, he was bound to admit that the paper was one of a most instructive character. He had been struck with many of the facts presented to them by Mr. Redgrave, showing the progress of manufactures from the days of the handloom to the present time, when they furnished clothing to the people of every country in the world; and also as to the high character of the English workmen as compared with those of other countries. He sincerely joined in the wish, so well expressed by Mr. Bazley, that our energies might be employed for the more extensive production of the great staple of cotton in our own colonial possessions, which could only be called forth by the magic of British capital and enterprise, both in India and Australia. He would make one remark with reference to the gentleman who had favoured them with this paper. There might be a difference of opinion as to the interference of the government with the rights of the manufacturers, but there was one course of conduct on the part of the government of which all must approve, and of which Mr. Redgrave afforded a triumphant example, viz., the making a judicious selection of gentlemen capable of collecting information upon matters of the greatest importance, affecting the commerce of the country, and throwing light upon the progress of a great branch of our manufacturing industry. He would express in the highest terms his sense of the valuable information which Mr. Redgrave had communicated to them that evening.

Mr. P. L. Simmonds said he rose with some diffidence to address the meeting after two such competent authorities as Mr. Baines, the representative of the woollen interests, and Mr. Bazley, the exponent of the cotton trade. But his plea for intruding was, that having recently been investigating in detail all the textile industries of the country, he might perhaps be able to add a few facts to the information which had been laid before them. Having lately had to prepare new editions of Dr. Ure's "History of the Cotton Manufactures," Ure's "Philosophy of Manufactures," and other commercial works, specially treating of the textile manufactures, he had necessarily become familiar with the extraordinary progress which had been made in all, whether in this or in foreign countries, in the last quarter of a century. The subject, however, was so comprehensive, that it would only be possible to allude to one or two commercial and statistical facts bearing upon it. Unfortunately, as Mr. Redgrave had observed, there were but very insufficient data available as to the manufacturing industries in foreign countries, to enable us to institute anything like fair comparisons. The paramount importance of the textile manufactures of this kingdom, both as regarded the social progress, comfort of the people, and extension of foreign commerce and civilisation, no one would be disposed to deny, seeing that they gave employment to one-fifth of the population, and that we had twice as many spindles at work, and (within 14,000 or 15,000) nearly as many operatives employed thereon as all the countries of the Continent of Europe. But, as had been well pointed out by Mr. Redgrave, the subsidiary employment given to many other trades should be taken into consideration, and if these could be estimated in any way, they would be found also to reach a very large sum. For instance, even in the case of skips or baskets, which had been alluded to, the aggre-

gate cost of these must be something considerable, for he knew that in one factory the cost of the stock of skips amounted to £2,600. Highly as he appreciated the very interesting paper which had been read, he could have wished that Mr. Redgrave had brought down his statistics to a later period. The year 1856, just after the conclusion of the Russian war, was scarcely a fair criterion to judge of the progress and position of our factories, spindles, and their produce at the present time. Mr. Redgrave, from his official position, might have been able to bring down the returns of factories and spindles to a later period than four years ago, and so with the exports and home consumption, official returns existed, and data were available, from which estimates might have been framed for even the past year. In contrast with the return submitted by Mr. Redgrave for 1856, he would offer the following estimate, as a closer approximation he thought to the position of the four great textile industries at the present time, or for 1860;—

Textile Industry.	Estimated Value of Goods manufactured.	Declared Value of Quantity Exported.	Estimated Quantity consumed in this country. Value.
	£	£	£
Cotton......	104,000,000	52,000,000	52,000,000
Wool and Worsted	32,000,000	16,000,000	16,000,000
Flax.........	18,600,000	6,600,000	12,000,000
Silk	18,400,000	2,400,000	16,000,000
	173,000,000	77,000,000	96,000,000

Now in explanation of this table he would offer a few remarks. Firstly, with respect to cotton. The value of the manufactures consumed in this country it was difficult to arrive at. Messrs. Du Fay and Co., and other competent authorities, went so far as to estimate it a few years ago at one-third more than that exported. But he considered this too high now. Indeed it was questionable whether as much was used up here as was shipped, although there were numberless ways in which cotton was worked up, as had been already stated by Messrs. Bazley and Baines, in mixed fabrics, in paper, and for many economic purposes, which ought to be considered in the estimate. Our exports of cotton manufactures and yarn had certainly doubled in the last ten years. In 1850 we shipped £28,400,000; in 1855, £34,800,000; and in 1860, £52,000,000. The imports of raw cotton had also doubled in the same period. In 1850 we received 663½ million pounds; in 1855, 892 million pounds, and in 1860, 1391 million pounds. Passing next to wool and worsted—for he would take these two manufactures together—the value of the trade had progressed more favourably than even Mr. Baines had stated, although it had the disadvantages of high price for raw material, and difficulties of labour, which had been so clearly pointed out. With respect to the home production of wool, Mr. Baines estimated it at 175,000,000lbs.; he (Mr. Simmonds) calculated it at 200,000,000lbs., but these opinions were, of course, conjectural, although he had taken some pains to arrive at an approximation to the truth. The nett imports of foreign and colonial wool (less the re-exports) were, in 1850, 64,000,000lbs.; in 1855, 70,000,000lbs.; and in 1860, 118,000,000lbs. The imports of woollen manufactures, including yarn, &c., had been to the value of £9,000,000 in 1850, £7,700,000 in 1855 (a year of war), and £16,000,000 in 1860. He thought he was not far wrong in estimating an equal amount for home consumption in a country where warm clothing was so essentially necessary, and so generally used by all classes. He would pass next to the linen trade. There were more than 100,000 acres under culture with flax in Ireland, and at least £12,000,000 of capital employed in the trade. Our foreign supplies of flax had been declining, for in 1850 we received 1,822,918 cwts., while in each of the past years we had received less than 1½ million cwts. But there was a fibrous material brought in and largely worked up now at Dundee with flax, which ought not to be lost sight of, and that was jute, of which we imported upwards of 1,000,000 cwts. in 1859, a quadruple increase since 1853. Our exports of linen manufactures had not increased very rapidly; the value of the shipments in 1850 and 1855, was £5,000,000, and in 1860, £6,600,000, but the bulk of this manufacture was used at home, and was fully double the value of that exported. The last textile for notice was silk; and here, too, the principal quantity made was used at home. The value of the exports stood in the following order:—1850, £1,250,000; 1855, £1,524,000; 1860, £2,400,000. On this textile, having no other data to go upon, he was content to take the estimates of Mr. Redgrave for 1856. The total value, from the data and estimates he had submitted, showed an increase of fully 50 per cent. upon the returns submitted by Mr. Redgrave, and, even making all reasonable deductions for error, they would give, he thought, a fairer estimate of the magnitude of the trade and of the present aggregate value of the textile industries of the kingdom. There was but one other point he would touch upon, and that was the incidental mention made of the utilisation of waste substances, the collection of the blowings and droppings, the recovered grease in the wool-factories, the reconversion of old rags, and mixed fabrics, &c. These had risen into such importance that woollen rags, at one time worth only £4, now, we were told, fetched £40 per ton. He was glad to find that these secondary products were not considered beneath notice by Mr. Redgrave, since he (Mr. Simmonds) had been taken to task rather severely lately for dwelling upon them in a paper which he read before the Society. The use of these had been stigmatised as a fraud upon the consumers, and a disgrace to the manufacturers and to the country. But, in truth, the reconversion of old wool was a matter of necessity, arising from the dearth of raw material and the demand for cheap goods. The incidental mention of these, and the extent to which they were used, would at least, he hoped, have the effect of causing more attention to be given to the extended production of all the staples for textile industries so much in demand among our manufacturers, and upon which the comfort of the people, the wealth of the country, and the extension of our foreign trade, were so largely dependent.

The Chairman said it was his duty now to bring to a close proceedings which he believed had been as interesting as he was sure they must have been instructive to all who had listened to them; and in asking them to allow him to convey their thanks to Mr. Redgrave for his paper, he would offer only one or two remarks. It had been mentioned, as a matter of regret, that Mr. Redgrave had not brought his statistics down to a more recent period; but he (the Chairman) would ask them to remember that statistics other than those referring to this country had been brought forward. Those statistics referred to the relative amount of power and number of persons employed in these manufactures in this country and in foreign nations, and the comparisons could only be made by taking the statistics of the same period of time. If Mr. Redgrave had taken the returns of 1860, it would no doubt have been seen that Mr. Bazley was quite right in saying that there had been an increase in our exports of these manufactures to the extent of ten per cent. every year, for they found that the exports of textile fabrics in 1859 amounted to 79,000,000 as compared with about 60,000,000 in 1856. With regard to the growth of our manufacturing system, especially in cotton fabrics, it seemed to him one of the wonders of our history. Scarcely a century had elapsed since the entire annual value of our cotton manufactures was

only about £200,000, and he believed our textile manufactures might now be fairly estimated at £150,000,000, and probably between £80,000,000 and £90,000,000 of that sum was due to cotton alone. And when they looked at the extent to which their social relations had been enlarged during that century of time, how there had been substituted for a merely pastoral population and cultivators of the soil a large and intelligent race of mechanics; how this had contributed to increase the wages of the labouring classes; how it had contributed to the growth of the wealth and power of the country, unparalleled in the history of any other nation—he thought they ought to have before them very frequently notices of this gigantic manufacture. He was little disposed to sympathise with those who looked despondingly upon our future supplies of cotton; and had full confidence that the energy, activity, and freedom of this country would carry us safely through all the difficulties which now threatened us. He begged to propose a cordial vote of thanks to Mr. Redgrave for his paper.

The vote of thanks having been passed,

The Secretary announced that on Wednesday evening next, the 13th inst., a paper "On the Best Method of Representing the Mineral Kingdom and Mineral Manufactures in the International Exhibition of 1862," by Professor D. T. Ansted, M.A., F.R.S., would be read.

EXHIBITION OF 1862.

The Lieutenant-Governor of New Brunswick, in his opening Speech to the Legislature, refers to a Provincial Exhibition to be held there this year, and suggests that the inquiries and arrangements connected with this Exhibition may be combined with preliminary steps for the due representation of the Province, both in natural products and articles of manufacture, at the International Exhibition of 1862.

INTERNATIONAL WEIGHTS AND MEASURES.

On Thursday evening next, the 14th instant, a Lecture will be delivered, in the Hall of the Society of Arts, Adelphi, by permission of the Council, "On the Importance to Education of the Introduction of the Metrical System of Weights and Measures," by James Yates, Esq., M.A., F.R.S. This will be the last of a Course of Four Lectures delivered in the Hall on the subject, on behalf of the International Association.

REFORM IN TEACHING THE ENGLISH LANGUAGE.

In a lecture recently delivered at the Royal Institution, by the Rev. A. J. D. D'Orsey, of Cambridge, the following suggestions were offered:—

1. Training schools for Nursery Governesses.

2. Greater care in giving National Schoolmasters a thorough knowledge of English, spoken and written.

3. Encouragement to really good men to become and to remain National masters, by rewarding distinguished veterans with School Inspectorships, instead of limiting such offices, as at present, to young clergymen and barristers.

4. The appointment, by the Committee of Council, of a Government Lecturer in each county, whose duty it should be to lecture on the principles of English teaching, and to instruct the schoolmasters.

5. The introduction of a thoroughly accomplished scholar as English Master in every great public school, not a mere educational drudge—a "general utility gentleman," to look after the "small boys"—but one of equal rank with the classical masters.

6. The endowment of at least one Professor of English in every University, his duty being to give men, during their Under-graduate career, a critical knowledge of the language — supplying deficiencies, correcting errors in speech and writing, suggesting courses of reading, drilling the future barrister and legislator in accurate and fluent oratory, and training candidates for the ministry to read distinctly and unaffectedly, and to compose and deliver sermons in a clear, impressive, and attractive style.

7. Making English take its place with Latin and Greek in every examination for degrees, as it does in the India Civil Service examinations, and giving substantial rewards (Scholarships and Fellowships) for distinction in English as for eminence in Classics and Mathematics.

8. The co-operation of the bishops in exacting from all Candidates for Holy Orders proofs of competency in reading the Church Service, composition, delivery of sermons, and extemporaneous speaking.

The speaker was perfectly aware of the objections that would be raised against such proposals, but if these, or most of these, were carried into effect, he believed the greatest benefits would result, not merely in a literary, but in a moral and religious point of view.

Home Correspondence.

VENTILATION OF MINES.

Sir,—Our collieries were commenced in olden times, by those persons who found that mineral coal would burn and make strong fires, and who first scratched them up where the coal measures happened to crop out to the surface or nearly so. Since then our collieries have advanced to their present apparent state of perfection, enjoying all the advantages of mechanical improvement and modern science. But their beggarly origin still adheres in a sensible degree to many parts of the management and working, and they will never be entirely free from the disastrous and fatal effects of explosions and choke-damp until we shall have lost sight of the baseness of their first commencement, and such measures be adopted as may reduce the casualties of the miner to a minimum, or to those accidents which, unhappily, are inseparable from underground workings.

That noble invention, the miner's safety lamp, so valuable as a test of the presence of hydrogen, has signally failed to prevent the recurrence of explosions. The only result of its use as a "working light," has been that of enabling the miner to work in an atmosphere highly injurious to the human frame, and generally so impure that only continued use enables the men to bear it. As a working light the Davy lamp must be entirely discontinued, if only on account of the accidents and misuse to which the lamp itself is subjected, as a blow by a fragment of mineral, or the pick of the miner, is, in fiery mines, a certain cause of explosion or death.

Neither can we place any confidence in complicated rules and regulations, always very imperfectly carried out or obeyed, and which never did, nor ever will, prevent the recurrence of accidents in mines.

The miner must be allowed to work in his own way, with good air to breathe and plenty of light, free from all rules and regulations with the exception of those relating to workmanship.

This great object is only to be obtained by sinking upcast shafts, or large bore holes, in such situations as to cut the highest level underground, at which point all the foul and heated air and hydrogen would naturally accumulate. The upcast current, if sufficiently powerful, will cause

the fresh air to flow from the downcast shaft, always situated at the lowest level of the mine, through every adit, level, or gallery, up to the heading where the miner is at work, by all the usual means of partitions, doors, brattices, flexible tubes, &c., and render the whole mine comfortable, safe, and healthy.

The current in the upcast shaft may be accelerated to any required degree of speed by furnace draft, fans, or other mechanical appliances, but, whatever means may be employed, (always in duplicate, to prevent the stoppage of ventilation for repairs), they should be entirely above the surface, and visible to all persons without having to go underground.

This is not the first time such a proposal has been advanced, but it has always been met with the peremptory argument, that no colliery could stand the expense of sinking extra shafts or bore holes for the sole purpose of establishing a perfect system of ventilation. Setting aside all views of humanity, this argument is worthless as a money consideration, for the produce of the miner's labour must be far more valuable when he can work with plenty of light, and good wholesome air to breathe, without the fear of being suffocated or being burnt alive, and quite unhampered by a lot of rules badly carried out and often neglected.

I entirely set aside the consideration of the cost to the public of the maintenance of thousands of widows and orphans, for though colliery owners may derive princely revenues from their mines, they never take that charge upon themselves. I am far from attributing want of human feeling, but merely state the custom.

The miner has a miserable life of it, independently of the numerous casualties he is subjected to by faults and failures of the winding machinery. The miner is cut off from the light of day for a very large portion of his life, even from early childhood, and if not killed, his years are very much curtailed from the average duration of a working man's life.

How is it that so few collieries have adopted any of the beautiful inventions, fully carried out and proved, for the prevention of accidents by the breaking of the flat rope or chain, or against the possibility of over-winding.

It is our bounden duty to alleviate the miner's manifold sufferings by every means in our power. Fortunately every means adopted to render his toil less irksome, dangerous, and unhealthy, will also tend to raise the value of mining property.

Under this system an army of overlookers, watchmen, firemen, lamp-men, and their attendants, might be dispensed with, as well as the expense of providing safety-lamps for every miner, as a few only would be required to be hung up at permanent points in order to give warning of the undue presence of hydrogen, or fire damp, so that signals could be made to the engine driver above ground to accelerate the speed of the ventilating apparatus, until danger is removed.

Under such a system the miners' candle might be almost entirely dispensed with, and the far better and cheaper mode adopted of gas illumination, partly, of course, by means of flexible tubes, but the gas-works should always be above ground.

I am, &c.,

HENRY W. REVELEY.

Poole, Feb. 26th.

MEETINGS FOR THE ENSUING WEEK.

MON. ...Medical, 8½. Mr. Thomas Bryant, "Suggestions for an improved practice in Strangulated Hernia."
Royal Geographical, 8½. 1. Consul Pemberton Hodgson, "Account of Excursions made in Yesso, Japan." 2. Sir R. H. Schomburgk, "Travels in Siam;" communicated by Sir R. J. Murchison.
TUES. ...Horticultural, 1. Election of Fellows, and a ballot for seeds.
Royal Inst., 3. Professor Owen, "On Fishes."
Syro-Egyptian, 7½. Rev. Mr. Cowper, "On the Golden Nacæa."
Civil Engineers, 8. Mr. John Murray, "On the North Sea, or German Ocean, with remarks upon some of its Estuaries, Rivers, and Harbours."
Medical and Chirurg., 8½.
Zoological, 9.
WED. ...Literary Fund, 2. Anniversary.
Society of Arts, 8. Prof. D. T. Ansted, "On the best method of representing the Mineral Kingdom and Mineral Manufactures in the International Exhibition of 1862."
Graphic, 8.
Microscopical, 8.
R. Soc. Literature, 8½.
Archæological Assoc., 8½.
THURS...Royal Inst., 3. Prof. Tyndall, "On Electricity."
Roy. Soc. Club, 6.
Philological, 8.
Royal, 8½.
Antiquaries, 8½.
FRI.......United Service Inst., 3. Lt.-Col. H. Garnet Man, "On Military Sketching."
Statistical, 4. Anniversary.
Royal Inst., 8. Mr. Latimer Clark, "On Electrical Quantity and Intensity."
SAT. .....Royal Inst., 3. Dr. E. Frankland, "On Inorganic Chemistry."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on February 19th, 1861.

Par. Num.
14. Agricultural Labourers' Earnings—Return.
23. Cambridge University—Paper.
25. Bills—Appropriation of Seats (Sudbury and St. Alban's).
27. „ Irremoveable Poor.
28. „ Removal of Scotch and Irish Poor.
29. Tramways (Scotland).

Delivered on February 21st, 1861.

8. Duchy of Cornwall—Account.
20. Natural Vaccine Board—Copy of Report.

Delivered on February 22nd, 1861.

25. East India (Karen Mountain Tribes)—Copy of Report.
33. East India (Loan)—Return.
34. East India (Revenues)—Return.
41. Sugar and Molasses—Return.
42. Malt—Return.
29. Railway and Canal Bills.
31. Bills—County Franchise.
32. „ Superannuation (Officers of Prisons).
34. „ Nonconformist's Burial.
35. „ Burial Franchise.
36. „ Conveyance of Voters.
37. „ Church Rates Commutation.

Delivered on 23rd and 25th February, 1861.

26. Cambridge University—Papers.
35. Mint—Account.
45. Navy (Steam and Sailing Ships)—Return.
38. Trade and Navigation Accounts (Dec. 31, 1860).
43. West India Islands, &c. (Relief)—Account.
47. Church Rate Bills—Return.
48. Queen Anne's Bounty—Account.
50. East India (Negotiable Home Debt)—Account.
51. Railway and Canal Bills—First Report from Committee.
54. Committee of Selection—Second Report.
38. Bill—Bank of England Payments (Amended).

SESSION, 1860.

588. Election Petitions—Return.

Delivered on 26th February, 1861.

3. Corporal Punishment—Return.
46. Thames Conservancy Returns.
52. Bullion—Return.
56. Government Property.
39. Bill—Marriage Law Amendment.
China—(Expedition up the Yang-tze Kiang)—Further Correspondence.
United States—Correspondence.

Delivered on 27th February, 1861.

42. Bills—Registration of Births (Ireland).
45. „ Affirmations.

Delivered on 28th February, 1861.

39. Flogging (Navy)—Return.
61. Atlantic Steam Navigation Company (Return.)
29. Railway and Canal Bills—Nos. 1. Alcester; 2. Alva; 3. Atherstone and Whitacre; 4. Barnsley Coal; 5. Birmingham Canal Navigation; 6. Bishop's Castle; 7. Bishop Stortford, Dunmow, and Braintree; 8. Blackpool and Lytham, Blyth and Tyne; 9. Bognor, Bradford, Wakefield, and Leeds; 10. Bristol and South Wales Union; 11. Caledonian (Cleland, &c., Branches; Rutherglen and Coatbridge Branch; Stonehouse Branch); 12. Cardiff and Carephilly; 13. Chard and Taunton; 14. Cheshire Midland; 15. Cleveland; 16. Cocker-

mouth, Keswick, and Penrith; 17. Coleford, Monmouth, and Usk and Pontypool; 18. Cornwall; 19. Cradley, Heath, and Dudley; 20. Dublin, Wicklow, and Wexford; 21. Dumfries, Lochmaber, and Lockerby Junction; Dumfries, &c. (Deviation at Dumfries); 22. East Suffolk; 23. Ellesmere and Whitchurch—Board of Trade Reports.

43. Bills—Inclusive.
44. „ Marriages Validity.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, March* 1*st*, 1861.]

Dated 5*th February*, 1861.

298. W. Paton, Johnstone, Renfrew, N.B.—Imp. in coating, colouring, and glazing, or finishing laces, bands, straps, belts, and other similar articles, and in the machinery or apparatus employed therein.

Dated 11*th February*, 1861.

336. H. Louch, Love-lane, Shadwell—Imp. in the manufacture or spinning of yarns or threads from hemp, flax, cotton, or other fibrous materials, and in the apparatus employed therein.

Dated 12*th February*, 1861.

352. N. Frankenstein, Mincing-lane—Imp. in syphons for drawing off liquids from casks and other vessels. (A com.)
354. J. Bowron, Stockton-on-Tees—Imp. in the manufacture of bottles and other vessels of glass.
356. W. Corbett, Clayton, near Manchester—Imp. in the arrangement and construction of puddling and heating furnaces employed in the manufacture of iron and steel.

Dated 13*th February*, 1861.

360. W. Brown, Edgar-place, James-street, Mile-end—Imp. in the manufacture of frames, suitable for containing photographic and other portraits and pictures.
362. A. Ellissen, Moorgate-street—Improved apparatus for working the breaks of railway trains.
366. E. Cradock, High Holborn—Improved mechanism for improving the draught in open fireplaces, the same apparatus being applicable to deadening or extinguishing fires in such fireplaces.
368. T. T. Lawden and T. Jones, Birmingham—Certain imp. in breech-loading fire-arms.
372. W. Roberts, Millwall, Poplar—Imp. in portable or fire pumps, and apparatus connected therewith.

Dated 14*th February*, 1861.

375. G. Searby, Threadneedle-street—An improved steam guage.
377. P. S. Devlan, Elizabeth Port, New Jersey, U.S.—A new and useful bearing surface for all kinds of journal and axle boxes.
379. J. Garforth, Dukinfield, Cheshire—Certain imp. in metallic pistons.

Dated 15*th February*, 1861.

381. J. B. H. F. C. Nicolet, Brussels—A new system of ornamenting skin gloves.
383. M. A. Prenslan, Liverpool—Improved preparations for the cure and prevention of toothache, and the preservation of teeth.
384. G. J. Wainwright, T. Bradbury, and J. Lawton, Dukinfield, Cheshire—Imp. in machinery or apparatus for roving, slubbing, or spinning cotton and other fibrous materials.
385. W. H. Mansbridge, Camden-lodge, St. Paul's-road, Camden-town—Imp. in railway brakes.
386. A. Lecat, Crevecœur, France—Imp. in looms for weaving. (A com.)
387. A. Senior, Dumfries—Imp. in looms for weaving.

Dated 16*th February*, 1861.

389. J. Braham, Bristol—Imp. in spectacles and hand frames.
391. E. H. Barré and C. M. J. Blondel, Nantes, France—The manufacture of paper from a pulp obtained from wood, and all other vegetable produce of a woody nature, by means of the isolation of the cellular fibres.
393. L. H. Real, Paris—Imp. in weaving.
395. N. Nussey, Holbeck, Leeds—Imp. in machinery for preparing and combing wool, silk, cotton, flax, or other fibrous substances.

Dated 18*th February*, 1861.

397. R. Offord, jun., 79, Wells-street, Oxford-street—Imp. in the adaptation of india rubber, and the compounds thereof, to various parts of public and private carriages or vehicles.
399. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in sewing machines. (A com.)
401. C. Price, Wolverhampton, and E. Price, Berry Barr, Staffordshire—Imp. in locks and latches.

Dated 19*th February*, 1861.

403. J. B. Hawkins, North-street, Limehouse—Imp. in the construction of cocks for drawing off liquids and vapours, and for regulating the flow or passage thereof.
405. J. H. Brierley, 23½, Aldermanbury, London—A clasp, or fastener for belts, bands, or straps, or for imps. contained therein.
407. M. Paris, Hill Side, Wimbledon, Surrey—Imp. in fire-arms.
411. J. L. Jullion, Tynemouth—Imp. in the construction of the bearings and other rubbing surfaces of machinery. (A com.)
413. R. B. Burchell, Brooklyn, U.S.—An imp. in tighteners for the cords of curtains.
415. M. Henry, 84, Fleet-street—Imp. in furnaces. (A com.)

Dated 20*th February*, 1861.

417. E. Wilkins, 8, Bath-terrace, Camberwell New-road, Surrey—Imp. in the manufacture of boots, shoes, and goloshes, or other coverings for the feet, and in lasts or blocks for facilitating such manufacture.
419. J. Vavasseur, 28, Gravel-lane, Southwark—Imp. in steam generators or boilers.
421. J. Sutton, Sheffield—An imp. in the frames of spectacles.
423. W. Halse, Love-lane—An improved construction of reel for velvet or other ribbons.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

416. B. Nicoll, 42, Regent-circus, Piccadilly—An improved mode of treating needles used in sewing and other machines, applicable also to those parts of such machines that hold the needles, and applicable to all other descriptions of needles, and to scissors and to thimbles treated in like manner.—20th February, 1861.
451. Charles Eyland, Walsall, Staffordshire—Imp. in the manufacture of certain kinds of spectacle frames.—22nd February, 1860.

PATENTS SEALED.

[*From Gazette, March* 1*st*, 1861.]

March 1*st*.
2130. J. J. Stevens.
2133. G. P. Wheeler.
2134. G. P. Wheeler.
2145. M. Vergnes.
2147. W. R. Kinipple.
2148. J. Huggett.
2150. C. A. Schneider.
2152. W. H. Burke, senr., and W. H. Burke, jun.
2153. R. Wright.
2168. J. H. S. Wildsmith.
2169. J. Spratt.
2198. G. L. P. Coopman.
2235. M. Henry.
2271. G. Owen.
2401. C. Cowper.
3004. B. G. George.
3010. R. Mushet.
3030. R. Mushet.
3045. R. Mushet.
3054. A. Kyle.
3070. R. Mushet.

[*From Gazette, March* 5*th*, 1861.]

March 5*th*.
2177. W. E. Gedge.
2180. J. Wood.
2182. G. Zanni.
2183. F. J. Cantagrel.
2184. T. Thornton, E. Thornton, and J. Thornton.
2186. W. Wilkinson and H. T. Wright.
2187. T. Turpie.
2190. G. Wellman.
2207. J. Wright.
2208. J. Wright.
2213. E. Field.
2215. W. C. Somerville.
2216. G. Davies.
2237. D. Davies and J. Allen.
2238. A. Tronchon.
2335. W. Hargreaves.
2350. J. Winram.
2421. W. E. Newton.
2509. I. M. Singer.
2511. W. E. Newton.
2545. J. L. Jullion.
103. J. Sidebottom.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, March* 1*st*, 1861.]

February 25*th*.
386. A. J. Dessales.
441. C. F. Vasserot.
621. J. F. Brinjes, jun., and H. J. Collins.

February 27*th*.
410. A. Ripley.
416. W. H. Sleeboom.
425. G. A. Biddell.
439. H. G. Collins.

[*From Gazette, March* 5*th*, 1861.]

February 28*th*.
406. J. Billing.

March 1*st*.
404. W. E. Newton.
422. G. J. Parson & T. Pilgrim.
450. R. S. Bartleet.

March 2*nd*.
423. W. H. Graveley.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, March* 1*st*, 1861.]

February 27*th*.
523. J. Bour.

[*From Gazette, March* 5*th*, 1861.]

March 1*st*.
526. C. Nightingale.

March 2*nd*.
524. W. Vaughan and J. Scattergood.
945. W. Crosley & G. Goldsmith.

Journal of the Society of Arts.

FRIDAY, MARCH 15, 1861.

INTERNATIONAL EXHIBITION OF 1862.—GUARANTEE DEED.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others who take an interest in the Exhibition, will make it convenient to call there and attach their signatures to the Document.

GUARANTEE FUND FOR THE EXHIBITION OF 1862.

The following additions have been made since the last announcement in the *Journal* for March 8 :—

*** The names marked with an asterisk are those of Members of the Society of Arts.*

NAME.	AMOUNT.	REPRESENTING THE OBJECTS OF THE SOCIETY—ARTS, MANUFACTURES, AND COMMERCE.
*William Atkinson, 47, Gordon-square, W.C.	100	Arts.
John Heugh, Manchester	500	Commerce.
Bernhard Liebert, Manchester	500	Commerce.
George Wildes, Manchester	300	Commerce.
Philip Lucas, Manchester	300	Commerce.
*John Thomas Woodhouse, Ashby-de-la-Zouch	500	Arts.
*Alexander Robb, 79, St. Martin's-lane, W.C.	500	Arts.
John Dickinson and Co., 65, Old Bailey, E.C.	1,000	Manufactures.
Thomas Phythian, 430, West Strand, W.C.	100	Commerce.
Thomas Sowler, Manchester	100	Commerce.
John Sowler, Manchester	100	Commerce.
Francis Philip Rickards, Manchester	100	Commerce.
T. N. Hunt, 2, Upper Portland-place, W.	500	Commerce.
Kirkman Daniel Hodgson, M.P., 36, Brook-street, W.	500	Commerce.
Joseph Angell, 10, Strand, W.C.	500	Commerce.
Wm. Anderson Rose, Alderman, Queenhithe, E.C.	500	Commerce.
William Leuchars, 38, Piccadilly, W.	500	Manufactures.
*John Henry Murchison, Surbiton Hill, Kingston, S.W.	100	Arts.
*Reginald Read, M.D., 1, Guildford-place, W.C.	200	Arts.
James J. H. Lucas, 13, Upper Woburn-place, W.C.	1,000	Arts.
Thomas Cane, Mayor of Hereford	200	Arts.
*Arthur Ryland, Mayor of Birmingham	100	Arts.
Thomas Agnew, Jun., Manchester	100	Arts.
John Lamont Brodie, Manchester	100	Commerce.
Henry Calvert, Manchester	100	Commerce.
William Hepworth, Manchester	100	Commerce.
John Knowles, Manchester	100	Commerce.
Samuel Roebuck, Manchester	100	Commerce.
Edward Tootal, Manchester	500	Commerce.
Edward Walters, Manchester	100	Commerce.
William Wyld, Paris	100	Arts.
Richard Coles, Mayor of Southampton	100	Commerce.
*William Evill, jun., Lyncombe-house, Battersea, S.W.	300	Manufactures.
*Edward Vigers, 12, Chepstow-villas West, Bayswater, W.	100	Commerce.
*H. Dyte, 6, King's Bench Walk, Temple, E.C.	100	Arts.
James Whishaw, 16, York-terrace, Regent's-park, N.W.	100	Arts.
John Thomas, Mayor of Carmarthen	100	Arts.
Joseph Joel (Consul for Montevideo), Brompton Hall, Brompton, S.W.	1,500	Commerce.
John Francis Hodges, Mayor of Dorchester	100	Commerce.
Messrs. McQueen, Brothers, 184, Tottenham Court-road, W.C.	200	Commerce.
*Sir Wm. G. Armstrong, C.B., Newcastle-on-Tyne	500	Arts.
Francis Brown Douglas, Lord Provost of Edinburgh	100	Commerce.
George Lorimer, Master of Merchant Co., Edinburgh	200	Commerce.
Hugh Rose, Chairman of Chamber of Commerce, Edinburgh	200	Commerce.
Peter Clouston, Lord Provost of Glasgow	100	Commerce.
*Robert Griffiths, 69, Mornington-road, N.W.	250	Arts.
George William Martin, 68, Gloucester-crescent, W.	100	Arts.
*Ferdinand Joubert, 36, Porchester-terrace, W.	200	Arts.

NAME.	Amount.	Representing the Objects of the Society—Arts, Manufactures, and Commerce.
George Edmond Balfour, Manchester	250	Commerce.
Charles Hardy Bowker, Manchester	100	Commerce.
Wm. Thomas Blacklock, Manchester	500	Commerce.
Solomon Levy Behrens, Manchester	300	Manufactures.
Wm. George Cowlishan (James Houldsworth and Co.), Manchester ...	200	Manufactures.
George Charnley Dewhirst, Manchester	200	Manufactures.
James Dugdale, Manchester	1,000	Commerce.
James Collier Harter, Manchester	1,000	Commerce.
*Edward Riley Langworthy, Manchester	250	Commerce.
Henry Micholls, Manchester	100	Commerce.
Robt. Nathaniel Philips, Manchester	100	Commerce.
*John Platt (Platt, Bros., and Co.), Oldham	500	Commerce.
Walter Scott, Manchester	100	Commerce.
Henry Michael Steinthal, Manchester	100	Commerce.
John Tysoe, Manchester	100	Commerce.
Thomas Wrigley, Manchester	500	Commerce.
Earl of Bessborough, Manchester	300	Manufactures.
William Andrew Fairbairn, Manchester	500	Arts.
Thomas Caley, Norwich	100	Manufactures.
Carrett, Marshall, and Co., Sun Foundry, Leeds	100	Commerce.
Mark Smith (Wm. Smith and Bros.), Heywood, Manchester	300	Commerce.
John Carver (Carver Bros.), Manchester	100	Commerce.
Thomas Mosley (Thos. Mosley, Huish, and Co.), Manchester	100	Commerce.
Thomas Lings, Manchester	100	Commerce.
Wm. Graham, Manchester	100	Commerce.
Adolph Schwabe (Salis, Schwabe, and Co.), Manchester...	500	Commerce.
John P. Hibbert, Manchester	100	Commerce.
Isaac James (Mayor of Carlisle)	100	Commerce.
Henry Driver (Mayor of Windsor)	400	Commerce.
Dr. Burzorjee, Northwick Lodge, St. John's-wood-road, N.W.	100	Arts.
Guillermo Esteban Ballaras, Seville-villa, Carlton-hill, St. John's-wood, N.W.	500	Commerce.
W. S. Adams, 57, Haymarket, S.W.	100	Manufactures.
W. M. Seaman, 199, Sloane-street, S.W.	100	Arts.
William Smith, 20, Upper Southwick-street, Cambridge-square, W. ...	100	Arts.
*Warren De la Rue (Thomas De la Rue and Co.), 110, Bunhill-row, E.C. ...	1,000	Manufactures.
*Benjamin Edgington, 2, Duke-street, Southwark, S.E.	500	Manufactures.
Joseph Maynard, Colman-street, E.C.	1,000	Arts.
James Walker, F.R.S., LL.D.	1,000	Arts.

By Order,

P. LE NEVE FOSTER, *Secretary.*

EXAMINATIONS.—LOCAL BOARDS.

The following is a list of Local Educational Boards corrected for the present year, so far as returns have been received. The attention of Secretaries of Local Boards is particularly called to Par. 14 of the Programme of Examinations, as follows:—

14. The previous Examinations must be held by the Local Boards sufficiently early in the year 1861 to allow the results to be communicated to the Council, on a Form which will be furnished on application (See Form No. 2 in Appendix), on or before the 2nd April, *i.e.*, four weeks before the commencement of the final Examinations.

Steps should therefore be immediately taken for holding the previous Examinations.

It is particularly requested that those Secretaries of Local Boards who have not transmitted a list of their Boards as at present constituted (whether there be any alteration since last year or not), will immediately do so.

*** Those Boards marked thus have been formed this year.

Local Board for Aberdeen.

Mr. Henry A. Dewar, M.D., Union-street, Aberdeen, *Chairman.*
John Cruickshank, LL.D., late Prof. of Mathematics, Marischal College.
Mr. James S. Brazier, Lecturer on Chemistry, Aberdeen University.
,, William Rattray, Teacher, Free South Church School.
,, David Maver, Teacher, Free Bon-Accord School.
,, H. Ambrose Smith, Actuary, Secretary to the Northern Assurance Co.
,, Peter Cleland, Teacher, School of Art.

The above constitute the *working* Local Board, in addition to which, the following gentlemen, being connected with local Institutions for adult evening instruction, are also *ex-officio* members of the Board:—

The Lord Provost of Aberdeen.
The Senior Bailie of Aberdeen.
Mr. David Thomson, Professor of Natural Philosophy, University of Aberdeen.
Rev. John C. Brown, LL.D., 156, Crown-st., Aberdeen.
,, John Longmuir, LL.D., 15 E, North-street, Aberdeen.
Mr. Alexander Kilgour, M.D., Union-street, Aberdeen.
,, John Duguid Milne, Advocate, Aberdeen.
,, James Westland, Banker, 1 King-street, Aberdeen.
,, John Miller, Manufacturer, Sandilands Chemical Works, Aberdeen.
,, William Henderson, Sen., Architect, Loch-street, Aberdeen.
,, William Ramage, Architect, Union-street, Aberdeen.
,, Thomas Melville, Iron Merchant, Gallowgate, Aberdeen.
,, William Fraser, Surgeon, Union-terrace, Aberdeen.
,, William Brebner, Manager (E. L. Co.), Flour-mill, Brae, Aberdeen.
,, Alexander S. Cook, Merchant, Market-st., Aberdeen,
,, Alexander D. Milne, Bleacher (Richards and Co.), Rubislaw, Aberdeen.
,, John Bullock, Brassfounder, 2, Denburn-terrace, Aberdeen.
,, John Gray, Engineer (McKinnon and Co.), Aberdeen.
,, James Sinclair, Mechanics' Institution, Aberdeen, *Secretary.*

*** Local Board for the Aldershot District.

Capt. Charles Edward Mangles, Banker, and Chairman of the Royal Mail Steam Company and of the London and South Eastern Railway Company, *Chairman.*
Rev. James Dennett, Incumbent, Aldershot.
Mr. Donald Mangles Dewar, Manager of the West Surrey Bank, Aldershot.
,, Frederick Eggar, Architect and Surveyor, Alton, Hants.
,, Thomas Fabian, Clerk of Works, Royal Engineer Department, Camp, Aldershot.
,, William Hollest, Solicitor, Farnham.
,, William Ker, Clerk of Works, Royal Engineer Department, Camp, Aldershot.
Capt. George Newcome, Justice of the Peace, Aldershot.
Mr. Ben. Nichols, Solicitor, Farnham.
,, Henry Poppleton, L.C.P., Private Schoolmaster, Farnham.
Rev. Dr. Rule, Wesleyan Chaplain, Aldershot.
Mr. John Seymour, Assistant Manager of the Bank, Odiham, Hants, and Representative of the Mechanics' Institution, Odiham.
Dr. John Shoolbraid, M.D., Surgeon, Aldershot.
Mr. Chas. Stroud, Head Master of the Grammar School, Farnham, and Representative of the Young Men's Association, Farnham.
,, Thomas White, Outfitter, Aldershot.
,, James Wilkins, Clerk of Works, Royal Engineer Department, Aldershot.
,, Barrow Rule, M.C.P., Principal of the Classical and Mathematical School, Aldershot, *Secretary.*

Local Board for Andover.

The Mayor, *Chairman.*
Hon. and Rev. S. Best, Abbotts Ann.
Rev. C. H. Ridding, Vicarage, Andover.
Mr. Henry Thompson, Andover.
Rev. P. Ward, Andover.
,, H. M. White, Andover, *Secretary.*

Local Board for Ashburne.

Rev. J. R. Errington, Vicarage, Ashburne, *Chairman.*
Dr. Lee.
Mr. C. J. Welsh, Ashburne, *Secretary.*

Local Board for Ashford.

Mr. R. C. Mansell, Superintendent of the Carriage Department, Ashford New Town Railway Works, *Chairman.*
Rev. J. P. Alcock, Vicar of Ashford.
,, S. Lepard, Church Villas, Ashford.
Mr. J. J. Cudworth, Superintendent of Locomotive Department, South Eastern Railway Works, Ashford New Town.
,, T. H. Vie, Schoolmaster, Barrow Hill, Ashford.
,, J. Keener, Accountant, South Eastern Railway Works, Ashford New Town.
,, R. Rabson, Draper, Church Gates, Ashford.
,, F. Garaway, Schoolmaster, Ashford New Town, *Secretary.*

Local Board for Bacup.

Mr. Thomas Aitkin, Holmes, Bacup, *Chairman.*
,, Henry Maden, Spring Mount, Bacup.
,, J. H. Warrall, M.D., Bacup, *Secretary.*

Local Board for Banbury.

Rev. Henry Back, Vicar, *Chairman.*
Mr. James Stockton, Banbury.
,, A. B. Rye, Banbury.
,, Richard Henry Rolls, Banbury.
,, Charles Neighbour, ,,
,, John H. Beale, Banbury, *Secretary.*

Local Board for Barnet.

Rev. Frederick C. Cass, M.A., Hadley Rectory, N., *Chairman.*
Rev. Thomas R. White, M.A., Finchley Rectory, N.
Rev. John D. Bell, Brunswick-house, Barnet, N.
Mr. Charles T. Carter, (President of Institute) Hadley, N.
,, Frank Milne, Hadley, N.
,, Stephen J. Baldock, (Vice President of Institute), Barnet, N.
,, John Thimbleby, Barnet, N., *Secretary.*

*** Local Board for Battersea.

Rev. J. S. Jenkinson, M.A., The Vicarage, *Chairman.*
Mr. George Alder, St. John's-hill.
Rev. E. B. Badcock, B.A., Surrey-lane.
Mr. William Baker, The Cedars.
,, Philip Cazenove, Clapham-common.
,, William Evill, Jun., Lyncombe-house, St. John's-hill.
,, Benjamin Edgington, Abingdon-lodge, Lavender-hill.
Rev. Robert Graves, M.A., The Training College.
Mr. James Hewitt, F.R.G.S. ,, ,,
,, Charles Knight, Bridge-road-west.
,, James Lord, Wandsworth Common.
,, Charles Lucas, Sisters'-houses, Clapham Common.
,, John May, Hyde-road.
,, John Richardson, Bridge-road-west.
,, J. Sherratt, St. John's-hill.
,, George Shaw, L.R.C.S., Portland-house, King-street.
,, G. H. Simmonds, Bridge-road-west.
,, John Arch Stuart, Bridge-road.
,, William Sugden, B.A., Shakspere-villas.
Rev. I. M. Soule, St. John's-hill.
Mr. Charles Sumner, Clapham-common.
Major Cam Sykes, ,, ,,
Mr. Henry Sykes Thornton, M.A., F.R.S., Clapham-common.
,, Samuel Urwick, St John's-hill.
,, James Walton, Highbury-house, Lavender-hill.
,, T. E. Hardy, Bridge-road-west, and Lammas-hall, Battersea, S.W., *Hon. Secretary.*

Local Board for Belfast.

Mr. Joseph John Murphy, 13, College-square, East, Belfast, *Chairman.*
,, Thomas M'Clinton, 81, Donegall-street, Belfast.
Rev. John Scott Porter, 16, College-square East, Belfast.
Mr. Robert Patterson, 6, College-square North, Belfast.
Rev. Isaac Nelson, Sugarfield, Shankhill-road, Belfast.
Mr. Hamilton Pink, 2, Windsor-place, Belfast.
,, Charles Rainey, 118, Joy-street, Belfast.
Rev. William Julius M'Cullagh, Ballysillan, Belfast, *Secretary.*

Local Board for Berkhamsted.

Rev. J. Hutchinson, M.A., Rector of Berkhamsted' *Chairman.*
,, J. W. Cobb, B.A., Curate of North Church.
,, F. B. Harvey, S.C.L., Grammar School.
,, J. Hodge, Independent Minister.
,, J. R. Crawford, M.A., Master of Grammar School. *Secretary.*

Local Board for Birmingham and Midland Institute.

Mr. Arthur Ryland, Mayor, Calthorpe-street, Birmingham, *Chairman.*
,, W. Mathews, jun., M.A., Estate Agent, Hagley-road, Birmingham.
Rev. E. H. Gifford, M.A., Head Master of King Edward's School, Birmingham.
Mr. Robert Wright, Accountant, Temple-row West, Birmingham.
Sir Francis E. Scott, Bart., Great Barr Hall, near Birmingham.
Mr. Alderman Sturge, Corn Merchant, Broad-street, Birmingham.
,, Alderman Smith, Manufacturer, Calthorpe-street, Birmingham.
,, Alderman Manton, Manufacturer, Great Charles-street, Birmingham.
,, Councillor Gibbs, Wholesale Haberdasher, Temple-street, Birmingham.
,, Sebastian Evans, M.A., St. Ives, Highgate, Birmingham.
,, J. D. Goodman, Merchant, Minories, Birmingham.
,, Frederick Elkington, Manufacturer, Newhall-street Works, Birmingham.
,, Thomas Martineau, Solicitor, Cannon-street, Birmingham.
,, John B. Hebbert, Solicitor, New-street, Birmingham.
,, W. C. Aitken, Designer, Cambridge-street Works, Birmingham.
,, George Dixon, Merchant, Broad-street, Birmingham.
,, T. P. Salt, Surgical-instrument Maker, Bull-street, Birmingham.
,, Thomas P. Heslop, M.D., Temple-row, Birmingham.
,, C. E. Mathews, Solicitor, Waterloo-street, Birmingham.
,, Joseph Hart, Dyer, Hunter's-lane, Handsworth, Birmingham.
,, G. N. Potter, Brass-founder, Scholefield-street, Birmingham.
,, John Jaffray, Newspaper Proprietor, New-street, Birmingham, *Hon. Secretary.*

Local Board for Bishops' Stortford.

Rev. Thos. T. L. Bayliff, M.A., Vicar of Albury, Herts, *Chairman.*
Mr. Joseph Bell, M.A., Head Master, Collegiate School, Bishops' Stortford.
Rev. William J. Copeland, B.D., Rector of Farnham, Essex.
Mr. E. M. Dillon, M.A., Collegiate School, Bishops' Stortford.
Rev. Godfrey Goodman, Head Master, High School, ditto.
Rev. John Menet, M. A., Chaplain, Diocesan Training School, Hockerill.
Rev. William Mirrielees, M.A., High School, Bishops' Stortford.
Mr. G. Augustus Starling, M.D., L.R.C.P., Windhill, Bishops' Stortford.
Mr. F. Woodham Nash, B.A., Sion house, Birchanger, Bishops' Stortford, *Secretary.*

Local Board for Blackburn.

Mr. Miles Baron, draper, Northgate, Blackburn, *Chairman.*
,, Ellis Duckworth, builder, Blackburn, *Vice-Chairman.*
,, John Bell, goods traffic manager, Blackburn.
,, James Booth, druggist, Blackburn.
,, James Garstang, grocer, Blackburn.
,, John Garstang, schoolmaster, Blackburn.
,, Robert Hopwood Hutchinson, cotton spinner, Blackburn.
,, Thomas Livesey, mechanical engineer, Blackburn.
,, J. H. Margerison, book-keeper, Blackburn.
,, John Robinson, 31, King-street, Blackburn.
Dr. J. Withrington, Blackburn.
Mr. Robert C. Radcliffe, Solicitor, Blackburn, *Hon. Secretary.*

Local Board for Blandford.

Mr. Spence Abbott, Draper, &c., West-street, Blandford, *Chairman.*
,, Edward Fisher, Draper, Market-place, Blandford.
,, Wellington E. Groves, Pharmaceutical Chemist, Market-place, Blandford.
,, James B. Green, Architect and Surveyor, Salisbury-street, Blandford, *Secretary.*

Local Board for Bradford.

Rev. R. W. Smith, M.A., Incumbent of Christ Church, Hanover-square, Bradford, *Chairman.*
,, J. R. Campbell, M.A., Independent Minister, Great Horton-road.
Mr. J. A. Clapham, Manufacturer, Little Horton-lane.
,, Thomas Clark, Bank Clerk, 5, Manor-row.
Rev. H. B. Creak, M.A., Professor of Philosophy and Mathematics, Airedale College.
,, Daniel Fraser, LL.D., President of Airedale College.
Mr. J. V. Godwin, Stuff Merchant, Peel-place.
Rev. S. G. Green, B.A., Classical Tutor, Rawden College.
Mr. James Hanson, Proprietor of the *Bradford Review*, Great Horton-road.
,, Jonas Hey, Woolsorter, 1, Edward-street.
,, J. M. Jaques. Warehouseman, 5, Manor-row.
Rev. John Jones, Wesleyan Minister, Hanover-square.
Mr. James Law, Stuff Merchant, Claremont.
,, Charles Lund, Accountant, &c., Darley-street.
,, J. T. Newboult, Borough Rate Collector.
Rev. J. H. Ryland, Unitarian Minister, Cliff Villas, Manningham.
Mr. A. Smith, Warehouseman, 1, Sawrey-place.
,, S. Smith, Woolsorter, Bedford-street.
,, M. H. Walls, 66, Victoria-street, Bradford, *Secretary.*

Local Board for Sussex (Brighton).

Mr. W. Alger, Mayor of Brighton, *Chairman.*
Rev. John Allen, 4, Vernon-terrace, Brighton.
Mr. W. W. Attree, Queen's-park, Brighton.
,, S. Bastick, Brighton.
Dr. Beard, Grand-parade, Brighton.
Mr. R. B. Bessant, Brighton.
,, Philip Capon, Brighton.
,, G. Cobb, 1, Hampton-place, Brighton.
,, A. Creak, 118, Lansdowne-place, Brighton.

Rev. J. Griffith, College, Brighton.
,, E. C. Hawkins, Vernon-terrace, Brighton.
Mr. James Howell, 7, Guilford-road, Brighton.
Dr. Jardine, Portland-place, Brighton.
Rev. J. Newton, Eastern-road, Brighton.
Mr. G. de Paris, Atlingworth-street, Marine-parade, Brighton.
,, M. Penley, Gothic-cottages, Western-road, Brighton.
,, John Peto, Malvern-house, Buckingham-place, Brighton.
,, P. S. Rickards, 57, Lansdown-place, Brighton.
,, W. D. Savage, 65, Edward-street, Brighton.
,, Sleight, Eastern-road, Brighton.
Dr. Turrell, Montpellier-house, Brighton, *Treasurer.*
,, T. W. Wonfor, Clifton-cottage, Clifton-road, Brighton.
Mr. Barclay Phillips, 75, Lansdowne-place, Brighton, *Secretary.*

Local Board for Bristol.

Rev. Canon Girdlestone, M.A., Wapley, Gloucestershire, *Chairman.*
Mr. G. C. Ashmead, 1, Alma-vale, Clifton.
,, G. H. Bengough, The Ridge, near Bristol.
Rev. T. Bowman, M.A., Principal of Bishop's College, Bristol.
,, C. Brittan, M.A., Wetherall College, Clifton.
,, J. Burder, M.A., South Parade, Clifton.
Mr. J. A. Cooke, Windsor-terrace, Clifton.
,, J. D. Corfe, 31, Richmond-terrace, Clifton.
Earl of Ducie, Tortworth-court, Gloucestershire.
Mr. P. H. Edlin, Lennox-villa, Clifton.
Rev. G. Elliott, D.D., Dean of Bristol, Deanery, College-green, Bristol.
Sir A. H. Elton, Bart., Clevedon Court, near Bristol.
Mr. J. S. Fry, Cotham New-road, Bristol.
Rev. Professor Gotch, Baptist College, Stokes Croft, Bristol.
Mr. F. W. Griffin, Ph.D., School of Chemistry, Kingsdowne-parade, Bristol.
,, J. S. Harford, F.S.A., Blaize Castle, Henbury, near Bristol.
Rev. N. Haycroft, M.A., Portland-square, Bristol.
Mr. F. Hazeldine, B.A., Bruton-place, Clifton.
,, M. D. Hill (H.M. Commissioner in Bankruptcy for Bristol District), Heath House, Stapleton, near Bristol.
,, C. T. Hudson, M.A. Principal of Grammar School, Bristol.
,, W. H. G. Langton, M.P., Clifton Court, Clifton.
,, D. Mackie, M.R.S.A., Queen's-square, Bristol.
,, Henry Owgan, LL.D., Clifton-vale, Clifton.
Rev. Jas. Robertson, A.M., 1, Apsley-place, Durdham Down, Bristol.
Rev. D. Thomas, B.A., Hillside, Cotham, Bristol.
Mr. F. F. Tuckett, Frenchay, near Bristol.
,, R. H. Webb, Berkeley-square, Clifton.
Sir J. E. Wilmot, Bart. (Judge of County Court), Bristol.
Rev. J. R. Wreford, D.D.
Mr. J. F. R. Daniel, Athenæum, Bristol, *Secretary.*

Local Board for Brompton (near Chatham).

Rev. Daniel Cooke, Brompton, Chatham, *Chairman.*
,, Oliver Lang, Master Shipwright, H.M. Dockyard, Chatham.
Major John Williamson Lovell, R.E., C.B., Brompton Barracks.
Capt. Henry Schaw, R.E., Brompton Barracks.
Capt. Henry Young Darracott Scott, R.E., Brompton Barracks.
Mr. J. Greenleaf, St. Mary's Vale, Brompton, Chatham, *Secretary.*

Local Board for the Bucks and Berks Adult Education Society, Windsor.

The Hon. and Very Rev. Dean of Windsor, M.A., the Deanery, Windsor, *Chairman.*
The Hon. and Rev. Lord Wriothesley Russell, M.A., Canon of Windsor, Cloisters.
Viscount Kirkaldie, Thames-street, Windsor.
Rev. H. J. Ellison, M.A., Vicar of Windsor.
,, W. C. R. Flint, M.A., Vicar of Sunninghill.
,, C. D. Goldie, M.A., Vicar of Colnbrook, Slough.
Mr. J. A. Gilliat, Westbourne-place, Paddington.
Rev. E. Hale, M.A., Eton College.
,, H. Hawtrey, M.A., Minister of Trinity Parish, Church House, Windsor.
Mr. William Johnson, Eton College.
Rev. C. K. Paul, M.A., Senior Conduct of Eton, Eton College.
Mr. C. T. Philips, Sheet-street, Windsor, *Treasurer.*
,, T. H. Stevens, Eton College.
,, Henry Passmore, William-street, Windsor.
,, Thomas Chamberlain, Thames-street, Windsor.
Rev. Thomas Rooke, M.A., St. Alban-street, Windsor, *Secretary.*

Local Board for Bury.

Rev. E. J. Hornby, Bury, *Chairman.*
,, C. F. Hildyard, Bury.
,, W. R. Thorburn, M.A., Bury.
Mr. J. Hocking, Bury.
,, Edmund Bunting, Athenæum, Bury, *Secretary.*

Local Board for Canterbury.

The Very Rev. the Dean of Canterbury, D.D., *Chairman.*
The Rev. J. B. Kearney, M.A., King's School, Canterbury,
Mr. John S. Linford, Canterbury.
The Rev. John Mitchinson, M.A., Head Master of the King's School, Canterbury.
The Rev. Allen P. Moor, M.A., M.R.A.S., F.R.G.S., Sub-Warden of St. Augustine's College, Canterbury.
The Rev. Edward R. Orger, M.A., Fellow of St. Augustine's College, Canterbury.
Mons. L. L. Razé, Ramsgate.
The Rev. James C. Robertson, M.A., Canon of Canterbury.
The Rev. Henry P. Wright, M.A., Chaplain to the Forces, Canterbury.
Rev. Edward Gilder, M.A., Canterbury, *Secretary.*

*** Local Board for Carlisle Young Men's Christian Association.

William Browne, Esq., *Chairman.*
I. James, Esq., Mayor.
Mr. William Constable.
,, John Eccleston, *Secretary.*

*** Local Board for Carlisle Church of England Association.

Rev. W. Bell, M.A., Head Master, High School, Burlington-place, Carlisle, *Chairman.*
,, J. G. Doman, M.A., Second Master, High School, The Abbey, Carlisle.
,, T. G. Livingston, M.A., Minor Canon Carlisle Cathedral, Victoria-place.
Mr. Jos. Barnes, Teacher, William-street.
,, Alex. Richardson, English Master, High School, Cecil-street.
Herr Loth, Teacher of Languages, Burlington-place.
Mr. Thos. Harris, Stationer, 51, Castle-street, Carlisle, *Secretary.*

Local Board for Carlisle Mechanics' Institute.

R. Ferguson, Esq., Morton-house, Carlisle, *Chairman.*
A. Davidson, Esq., Banker, Devonshire-street.
Mr. T. Johnson, Teacher, Chiswick-street.
,, W. A. Williamson, Mechanics' Institute, *Secretary.*

Local Board for Carshalton.

Rev. George Capel, Manor-road, Wallington, Surrey, *Chairman*.
,, Edmund C. Batt, St. Edmund's Proprietary School, Carshalton.
,, William Everard Creasy, Surgeon, Carshalton.
,, William Morley, jun., North-street, Carshalton, *Secretary*.

Local Board for Chelmsford.

Mr. Horatio Piggot, Solicitor, Chelmsford, *Chairman*.
Rev. C. W. Arnold, M.A., Head Master, Chelmsford Grammar School.
Mr. Daniel Wheeler, Surgeon, Chelmsford.
Mr. Thomas Websdale Hunt, Schoolmaster, Springfield, Chelmsford.
Mr. Thomas Moss, Builder, Chelmsford.
Mr. Stephen H. Sharman, Schoolmaster, Baddon.
Mr. Edwin Adams, M.R.C.P. (of the Chelmsford Grammar School), Guildford-terrace, Chelmsford, *Hon. Secretary*.

_ Local Board for Croydon.

Rev. J. G. Hodgson, M.A., Vicar of Croydon, Vicarage, *Chairman*.
J. T. Hyde, Esq., M.A., Professor at Addiscombe College, Bromsgrove House,
Rev. I. P. Malleson, B.A., Birdhurst.
J. W. Flower, Esq., solicitor, Park-hill.
E. Westall, Esq., M.D., physician, Caterham, near Croydon.
Rev. Philip Smith, B.A., classical school at Croydon, St. James's-lodge.
A. Crowley, Esq., B.A., brewer, 63, High-street.
A. Carpenter, Esq., M.D., surgeon, 113, High-street.
W. Robinson, Esq., schoolmaster, Park-lane.
A. Twentyman, Esq., schoolmaster, Fairfield House.
L. Lewis, Esq., drawing-master, Coomb-street.
Rev. R. C. Fell, M.A. (clergyman, *not* in duty), George-street.
A. B. Cowdell, Esq., solicitor, Bedford-villas.
S. L. Rymer, Esq., dentist, North-end.
E. Hughes, Esq., Dingwall-road.
G. N. Price, Esq., wine-merchant, 114, High-street.
Mr. Francis Warren, bookseller, 131, High-street, *Secretary*.

Local Board for Darlington.

Mr. Joseph Whitwell Pease, J.P., Woodlands, Darlington, *Chairman*.
Dr. F. G. Clarkson, Paradise-row, Darlington.
Mr. David Dale, West Lodge, Darlington.
Dr. Wm. Haslewood, Skinnergate, Darlington.
Mr. Christopher Jackson, Master of St. Cuthbert's National School, Darlington.
Rev. John Marshall, B.A., Master of the Royal Grammar School, Darlington.
Mr. Fras. Mewburn, jun., Solicitor, Larchfield, Darlington.
Rev. W. H. Stephens, B.A., Incumbent of St. John's, Darlington.
Mr. Geo. S. Gibbs, Mount Pleasant, Darlington, *Secretary*.

_ Local Board for Deptford.

Rev. C. F. S. Money, M.A., Incumbent of St. John's, Deptford, St. Paul's Parsonage, Deptford, *Chairman*.
,, F. A. C. Lillingstone, Curate of St. John's, Deptford, 2, Clifton-villas, Lewisham.
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FOURTEENTH ORDINARY MEETING.

WEDNESDAY, MARCH 13, 1861.

The Fourteenth Ordinary Meeting of the One Hundred and Seventh Session was held on Wednesday, the 13th inst., Thomas Sopwith, Esq., F.R.S., Member of the Council, in the chair.

The following gentlemen were proposed for election as members of the Society:—

Abraham, Henry Robert	3, Bridge-street, Westminster, S.W.
Avery, Thomas Charles	Gloucester.
Biddulph, John	Swansea.
Blyth, Philip P.	53, Wimpole-street, W.
Bowen, Owen	4, Chatham-place, Blackfriars, E.C.
Brogden, Alexander	Ulverstone.
Broome, Robert	Burbage-house, Buxton.
Bruce, Right Hon. Sir James L., Knight	The Priory, Roehampton, S.W.
Butts, Thomas	20, Chester-terrace, Regent's-park, N.W.
Derry, David	Plymouth.
Fane, Wm. Dashwood	Board of Trade, S.W., and 7, Norfolk-crescent, Hyde-park, W.
Fisher, Peter	Whitehaven.
Fox, R. W.	Grove-hill, near Falmouth.
Halloran, Charles	Paignton School, Preston-house, near Torquay.
Hannay, Robert	Ulverstone.
Hannay, W.	Nottingham.
Harrison, George	Newport, Monmouthshire.
Harvey, John Francis	145, Strand, W.C.
MacNeill, Sir John, F.R.S.	Mount Pleasant, Dundalk.
Malcolm, John Wingfield, M.P.	7, Great Stanhope-street, Mayfair, W.
Moorsom, Vice Admiral C.B.	5, Montague-place, Russell-square, W.C.
Pain, George	New Lodge, Salisbury.
Petre, Hon. Henry W.	Bedfords, Romford.
Poole, James	Wick-house, Durdham Down, Bristol.
Pridham, T.	Hyefield, Bideford.
Saunders, Chas. Alexander	Great Western Railway Station, Paddington, W.
Spowart, T.	Broomhead-house, Dunfermline.
Taylor, J. John	Earsdon, Newcastle-on-Tyne.
Terrell, William	7, Apsley-place, Redland, Bristol.
Thomson, Wm. Gordon	14, Clifton-gardens, Maida-hill, W.
Thring, Henry	5, Queen's Gate-gardens, South Kensington, W.
Turquand, William	4, Mansfield-street, Cavendish-square, W.
Tylden, J. W.	Milsted Manor, Sittingbourne, Kent.
Underwood, Joseph	5, Hyde-park-gardens, W.
Walter, Capt. Edwin	37*a*, Upper Grosvenor-street, W.
Williams, John	Ketley-hill, Wellington, Salop.

The following candidates were balloted for and duly elected members of the Society:—

Cole, John Richard	Scarnell-villa, Pembridge-gardens, W.
Croft, Charles Percy, F.R.C.S.	2, Woburn-square, W.C.
Edmiston, Charles S.	5, Charing-cross, S.W.
Fortescue, Hon. Dudley Francis, M.P.	17, Grosvenor-square, W.
Hancock, C. F.	39, Bruton-street, W.
Lyon, Arthur	32, Windmill-street, Finsbury, E.C.
Marshall, J. G.	Headingly, Leeds.
Part, John Cumberland	186, Drury-lane, W.C.
Quallett, George Watts	10, New Bond-street, W.
Sowerby, William	16, Park-place, Maida-hill, W.
Weinberg, J. Julius	Belfast.

Previously to the reading of the paper, the Chairman stated that a telegram had been received from Professor Ansted, to the effect that, owing to the recent severe gales, he would be unable to reach England till too late to be present at the meeting.

The Paper read was—

SUGGESTIONS FOR THE COLLECTION AND ARRANGEMENT OF MINERALS AND MINERAL MANUFACTURES AT THE INTERNATIONAL EXHIBITION OF 1862.

By PROFESSOR D. T. ANSTED, M.A., F.R.S, F.S.A., &c.

The near approach of another "Great Exhibition" in London seems to offer a favourable opportunity for considering and discussing the most effectual way in which the various objects likely to be brought together should be arranged, so as to produce the most satisfactory result. Such a discussion may best originate in this place, for the forthcoming, as well as the former Exhibition, have been actively promoted, by the Council and the members of the Society of Arts, and the results of the Exhibition of 1851 were here commemorated in a series of lectures. The Society itself, also, is now so widely influential by its associated institutions and publications, that no more fit body exists amongst which to obtain the facts essential to a preliminary scheme of arrangement of any kind.

It is, I think, impossible for any of us to recall to recollection the marvellous assemblage of objects of beauty and interest brought together in Hyde-park ten years ago, without feeling that while much that was striking and grand in general effect was owing to the want of systematic grouping—each commissioner crowding or distributing the raw material and manufactures under his charge in the space allotted to him, in the shortest possible time—it was, on the other hand, impossible to compare similar raw material from different sources, or similar manufactures from different localities. The modes of treatment varied almost indefinitely according to circumstances, and the results obtained, whether steps towards the complete article or the state and condition of the material under treatment, were not very carefully shown in many cases. The Exhibition was one adapted beyond anything that had been then seen to arrest the attention of all—young and old—educated and uneducated—rich and poor; it fascinated the imagination, enriching with fresh ideas even the best informed—creating a taste where it did not exist; strengthening and confirming it in those with whom taste was nascent. Every one who came was astonished and went away instructed, and taught, in spite of himself, even if he did not do his best towards learning the lesson placed before him. As a first Exhibition, it was, indeed, exactly what was needed, and it has produced a great and abiding result, the reality and extent of which are best known by those who have since studied the general progress and development of art and manufactures in this country. A national taste was then created, and it has been growing and advancing in every direction from that time to this.

But if, as I believe is the case, a true national taste has been lately generated in England, and is now growing into importance, and that this is one of the results of the Great Exhibition of 1851, it is not less certain that the taste must exercise an influence on every branch of manufacture, and even after two or three generations on the national character. Such a taste is capable of being

directed and modified as well as allowed to grow, and it is hardly possible to imagine any means more likely to direct and modify national taste in a right way than to subject it to the trial of a second Exhibition, not less extensive, not less universal, and certainly not less magnificent than the first, but one in which a definite plan and system carefully carried out, shall be at once the distinctive character and the source of effects not less striking, though of a very different nature, than those obtained on the former occasion.

A careful consideration of the faults, weaknesses, and short comings of the system adopted in 1851, with the advantage of the experience gained on that occasion, and during the great Exhibition of Paris that so soon followed, ought to enable us now to see our way much more clearly than was possible eleven years ago. Then the whole of the arrangements were extemporised from abstract notions as to what might be sent—now we have a considerable amount of knowledge as to what will appear. Then we might, and did, make bold experiments, imagining beforehand how certain combinations might result, but quite unable to foresee any important reality. Now our experiments will be based on the knowledge of past effects, and it will be surprising indeed if the result does not in some measure correspond with the increased advantages we possess.

These remarks will of course apply to every department of the Exhibition—even to the division of fine arts, which, on the next occasion will, with so much propriety, form a most important section of the whole. Had it been determined in 1851 to include paintings, the machinery of arrangement, complete as it was, might have broken down under this increased pressure, nor could there have been a fit place for such objects of interest and value without a special adaptation inconsistent with the working out of the general scheme. In the same way it seems to me clear that had any attempt been made to group together all the similar objects from various countries, there would have arisen difficulties amounting to absolute impossibility, and we should have seen confusion worse confounded in more departments than one. None but those who were busily engaged in actual arrangement can imagine the nature and extent of these difficulties, but I am sure that none, whether they yielded to the obstacles or resisted them, will hesitate in admitting, that systematic and orderly grouping fairly carried out in detail, are not less desirable and obtainable in a future Exhibition than they were impossible in the last.

It was a principle in the last Exhibition to separate raw material from manufactured articles, and although in many cases there was no complete way of carrying the principle into practice, and occasionally steps were presented to view by which an article was prepared for use, this was always an interference with the system, not a part of it.

I think it will be found that in a second Exhibition it will both be easier and more instructive if the plan of arrangement be such as to connect the material with the use made of it. In this way a more instructive series will be given, and if the different materials of various countries are shown in all varieties of preparation, a great many curious and useful results cannot fail to be obtained.

Thus far I have ventured to offer suggestions applicable to all departments of the Exhibition. I would urge very strongly that the various objects of one kind, from whatever part of the world they come, should be exhibited side by side, or at least be so placed that they may without inconvenience be compared together. I should also urge that the exhibited manufactures should in all cases be accompanied by, and illustrate the raw material of which they are formed.

I am not unaware that considerable difficulty will arise in carrying these and other general principles into practical application, but I believe, unless these difficulties are overcome, no real progress will be made. The larger the Exhibition, and the more nearly it approaches completeness, the more will the absolute necessity of order be experienced. There can be no real order unless in each case there is some definite principle adopted, and some one able and willing to see the great object attained. Much more in the approaching Exhibition than in the last will this necessity be experienced, for it is recognised by all that distinct progress is to be shown, and not a mere repetition of what has long been known. I need not point out that great facility of comparison should be one of the characteristics of the method of arrangement adopted, and I am satisfied, that unless raw materials are sparingly shown in association with manufactures, and the various manufactures are placed so that like may be compared with like, without much regard to mere geographical questions, there can be no such Exhibition as England ought to show.

Perhaps there is no department in which definite order and plan are more necessary for a fit exhibition of the resources of our own and other countries, and a proper comparison of them, than that of minerals and mineral manufactures. But to give any idea of the importance of the subject, and even of the real interest that may and ought to attach to it, we require something more than an avenue of dusty specimens nearly a furlong in length, a multitude of specimens packed away in corners and out of the way places, and a few groups of exquisite and highly wrought works of art and manufacture with which the dusty specimens were never connected, and which, situated at distant points, admitted of, and certainly courted, no comparison. Outside the building, at the western extremity, were a few large and curious objects belonging to the same series, but not apparently connected with them.

I wish to remind you of these things that you may see how utterly inadequate was the representation of them to the acknowledged importance of the minerals and metals of the earth. If I were asked to mention the two things on which the material wealth of a country most depends, I should at once name iron and coal. Now, although some remarkable series of iron ores, and some samples of manufactured iron were exhibited, and an enormous expense was incurred in forwarding samples of coal and specimens of iron of large size, the want of means of presenting the various minerals, so that they should illustrate and be illustrated by the corresponding manufactures, was the cause of all this part of the Exhibition being comparatively unvisited. This, at least, was the impression made upon myself after great exertions on the part of all engaged in the arrangement of 1851, and it is for this reason that I am desirous of pointing out a means which may, I think, render the exhibition of minerals not only more useful, but greatly more attractive.

Assuming, then, in the first place, that the collections from all countries will be so far broken up as to enable them to be brought under some plan of general arrangement, and that there will be a combination of raw material and manufacture in each principal division, I would suggest a separation of the whole series of minerals and mineral manufactures into two groups, clearly enough marked in practice, although not very definable in terms. I would bring together into one group the metals and ores, the mineral fuels, the minerals, whether hard or plastic, used in construction, and a number of minerals used directly or indirectly in and for manufacturing purposes. One designation may apply to all these—they are utilitarian; they are on the whole more useful than ornamental. They are large in quantity; most of them not very showy, but all really and practically useful and valuable; rather on a large than a small scale.

The second division of minerals and mineral manufactures is quite as strongly marked, and is, I think, in practice very easily separated. It includes minerals used for ornamental and decorative purposes, for certain delicate optical and philosophical investigations, and experiments that belong to the lecture-room and the laboratory rather than to the manufactory; and for purposes of art, whether for sculpture of marble or gems, or for those lower grades

of art which include house and palace decoration, and ornamental furniture.

Several things may be mentioned, as illustrating the desirableness of some such grouping, and the real practical difference existing between the two divisions. Thus, in the first division, are the raw materials in their natural state, earthy, often unattractive and little calculated to please the eye, but these are substances that represent the true material wealth of a nation, and exhibited in each case in direct association with their results, they afford ample means of exciting attention and interest. Geographical sub-divisions in each group may be introduced, and they admit of being made instructive even to the best informed persons, and while a certain amount of repetition must be involved in every conceivable method of presenting collections of natural objects and human applications, without mere technical and museum arrangement, there need not be a simple repetition of similar specimens without meaning, as was too much the case in our own last great Exhibition, and much more so in the subsequent great Paris Exhibition.

Whilst, however, in the first division the minerals exhibited are admired and valued, not on account of their beauty, but because of their numerous uses, the largeness of the supply, and the difficulty or impossibility of doing without them in civilised life, the second division I propose is equally well marked by the intrinsic beauty and large money value of the minerals it contains, and the delicacy or difficulty of manipulating with them or preparing them for use.

Again, the minerals in the first division require to be exhibited together, with an ample exemplification of the methods of obtaining them, and the recent improvements in those methods. Those of the second division, on the other hand, must be shown rather with the objects made of them, than with the contrivances by which they are obtained.

The grouping I now propose for minerals and mineral manufactures includes the whole of the Classes I. and XXVII of the Great Exhibition of 1851, and many fragments of other classes besides the numerous collections seen in the foreign department of the geological specimens, minerals, stones and marbles, inlaid work, mosaic, and gems. The two divisions would occupy large but very different spaces, and though they should certainly be near together, they need not absolutely be on the same level or open into each other. Certainly the metalliferous minerals and ores, the mineral fuel, the minerals used for construction, and other collections, must be on a ground floor, but with regard to the second division, all specimens referred to it might occupy galleries above if consistent with the general plan.

It must not be supposed that the first division I propose to make would be without striking effect arising from the nature of the minerals exhibited. Constructions in marble, stone, and slate, and perhaps of brick, might be subservient at once to the general plan of the building and the details of arrangement. Mineral fuel might be brought in to produce effect, and diagrams illustrating methods and processes might with great advantage be accompanied by picturesque views of mining districts and mining operations. Models of apparatus and series of implements and tools adopted and used in mining and quarrying and preparing minerals for the market would properly belong to this department.

I have already alluded to a geographical subdivision by which the collections sent by various countries and districts would be within certain limits exhibited in groups. I am well aware both of the practical convenience and real advantage of this method, but I am satisfied it ought to be subservient to some general plan of arrangement.

To obtain such a series of minerals and mineral manufactures as would fitly illustrate the department, two things are necessary. First a settled and well digested plan, marking out the principal desiderata from different countries and districts and the relative position that each would ultimately occupy in the series. Next, a calculation of the extent and kind of space that would be required for the model Exhibition, and the gaps that may after every exertion be expected to occur. As it is altogether impossible that any first scheme should be perfect and complete, I put forth the plan which on much careful consideration seems to me most desirable, not with any intention or expectation of seeing it approved of and adopted without modification, but that those who have also considered the subject should have some starting point, and be able to say that this or that part of the plan is unpractical or unsatisfactory.

But I do not think a mere plan is sufficient. I have also prepared lists, at present very imperfect, of the various mineral substances used in the arts under the names known in science, in art, and in trade, with particular reference to the plan of arrangement I propose. These or similar tables, modified perhaps in some way, may no doubt be much improved by careful inquiry, and may become the basis of a system, so that a nearly complete list of minerals used alone or in manufactures may be made out. We may thus obtain a series marking with some distinctness the relative position of each country in the department in question at the time of exhibition, the absolute condition of human knowledge in reference to the use of minerals, and, by comparison with the lists published by mineralogists, serving to illustrate the exceedingly small extent to which the varieties of minerals are utilised. Were it not that the animal and vegetable kingdoms, as well as the mineral, are all remarkable for the small number of varieties of structure used by man, in comparison with the almost infinite multitude distributed over and within the earth, it might seem that we were negligent of this great source of wealth. Whether this is so or not will be best seen and proved by a succession of exhibitions, provided that in each an attempt is made to show what is known at the time, and what has been added to knowledge since the last opportunity of courting public attention.

I would urge, then, that in any future arrangement or exhibition, these three principles should be admitted. First—The principle of separating the bulky, more common, and less costly articles of mineral origin or manuufacture, from those which are comparatively small in the quantity obtained, valuable in proportion to their bulk, rare in their distribution, and costly in their preparation and use. Secondly—That raw materials should form, in most cases, the fundamental objects in series illustrating manufactures, and for other uses; and, thirdly, that all the collections of minerals and mineral manufactures from different countries and districts should be placed where they can most conveniently be compared with similar objects.

If these general principles are admitted, we may proceed with advantage to consider what minor divisions will be most advisable. Looking back at the great Exhibition, we shall find that there was little unity of expression in the departments we are considering, and this arose from various causes, which it is unnecessary here to recapitulate. A part of the English collections was in the south-west corner within the building; another part outside, beyond the west end; a third part in the nave; a fourth part in some bays in the northern side of the building; while the foreign collections were, some in the French Department, some in the Russian, and others in the East Indian and American divisions. Not only were they thus dispersed, but the subdivisions in the different countries were by no means the same, and in many cases no grouping at all was attempted.

It has seemed to me, on carefully going over the lists of useful and exhibitable minerals, that they admit of being divided into eight classes, which are marked in the accompanying plan A to G.

TABLE I.

GENERAL SKETCH OF ARRANGEMENT OF MINERALS AND MINERAL MANUFACTURES PROPOSED TO BE ADOPTED.

FIRST DIVISION.—Minerals and metals chiefly employed on a large scale in manufactures, and for various purposes:—

CLASS A.

Metals and Metalliferous Minerals used as Ores.

a. Collections of specimens of useful metals, and ores used for obtaining them.
b. Illustrations of the position of the minerals in the earth.
c. Illustrations of the methods adopted for extracting ores from the earth.
d. Illustrations of the methods for preparing them for sale.
e. Illustrations of the methods adopted for reducing the prepared ores to the metallic state.
f. Illustrations of the manufacture of useful alloys, and samples of alloyed metals.

CLASS B.

Mineral Fuels.

a. Collection of the various kinds of mineral fuel used in an unprepared state.
b. Illustrations of the position of these minerals in the earth.
c. Illustrations of the methods adopted in coal-mining.
d. Mechanical contrivances occasionally adopted for cleaning, drying, or preparing mineral fuel for sale.
e. Useful mineral substances obtained from mineral fuel by manufacturing processes.

CLASS C.

Minerals used for purposes of Construction.

a. Collection of the minerals.

1. Hard materials, viz.:—	Limestones and marbles. Sandstones, gritstones, and pudding-stones. Slates and slabs. Flag-stones. Granites.
2. Plastic materials, viz.:—	Clays. Puzzuolana and natural cements. Materials available for artificial stone.

b. Illustrations of quarrying and other processes for obtaining these minerals.
c. Illustrations of processes adopted for dressing, cleaning, manufacturing, burning, and otherwise preparing them for sale.
d. Collections illustrating their uses, and the constructions prepared from them.
e. Illustrations of methods and contrivances for preserving them from decay.

CLASS D.

Minerals used without other than Mechanical Preparation for various miscellaneous purposes in the Arts. Exhibited in each case in the natural state, and in the state in which they are used.

1. For grinding, cutting, sharpening, and polishing.
2. For drawing, writing, and engraving.
3. As pigments—for colouring, viz., in dyeing, calico-printing, pyrotechny; for encaustic work, in colouring glass or porcelain; for fixing colours and discharging colours.
4. As food, medicine, or poison; for cosmetics; as fluxes, or in preparing enamel; for mineral manure and dressing land.

CLASS E.

Minerals forming the essential ingredients in certain simple Manufactures. Exhibited in the natural state, in various processes of manufacture, and as prepared for the market.

N.B.—In this and the last class, the manufactured articles should be exhibited in each case side by side with the raw material.

SECOND DIVISION.—Minerals and metals chiefly employed for ornamental and decorative purposes, in the fine arts, and for scientific purposes on a small scale:—

CLASS F.

Gems or precious stones, and precious metals used for personal decoration. Exhibited unprepared and as used in jewellery.

CLASS G.

Crystalline minerals, gems, and precious metals used in natural philosophy, with illustrations of their chief uses.

CLASS H.

Crystalline mineral gems and precious metals used in the fine arts, and for decorative manufactures; in sculpture, mosaic and other inlaid work, cameos, intaglios, and for miscellaneous purposes.

Class A would include the metals used in the metallic state, and the various minerals from which metals are actually obtained in the arts. Under this very important head, I should include, 1st, geological sections, illustrating the position of such minerals in the earth, as, for example, the nature of beds and veins of ore, the natural accidents that have occurred to such deposits, the modifications that in the course of time, or by chemical change, have been induced in them, and the usual indications by which the presence of a mineral district may be detected. This would be strictly the geological introduction to a mineral exhibition, and should be confined very strictly to known facts, as distinguished from what are still speculative, although perhaps very important views bearing on the subject.

The next sub-class would include a series, as complete and characteristic as possible, of all minerals of the kind in question—that is, metals or metalliferous minerals made use of in the arts. In this series it would I think be very advisable to leave blanks for known omissions, making out beforehand a list of what ought to be present, and indicating the blanks. In this way a foundation would be laid for a complete museum, that may from time to time receive valuable additions in the event of the building or any part thereof being retained. It would add much to the interest and value of such a series were each group of minerals accompanied by a few lines stating the place at which it is worked for the market, the quantity annually extracted, the price at which the market is supplied, the technical and trivial name, and the chemical composition of the species. The extent of space required for this series would not be large, as the number of the minerals is very limited.

Next should be exhibited models, drawings, and descriptions of mining processes, mining machinery, and other contrivances for extracting ore from the earth; and these should be followed by similar illustrations of the methods adopted for preparing ores for the market, and reducing them to a marketable state. All these mechanical processes should be shown in their reference to the different mining districts of the earth. They would be exceedingly instructive, and mark the progress made since the last exhibition.

Lastly, it might be well to include in this first class of minerals an exhibition of the various metals and metallic alloys in common use, or as prepared for special purposes, and with these the series would naturally and properly close.

It may be well to point out here that as an industrial

exhibition ought to differ essentially from a museum, no resemblance to ordinary museum arrangement need be attempted in the carrying out of these suggestions into practice.

Mere mineralogical specimens or technical processes not actually adopted or suggested for adoption on a large scale should be strictly excluded, and if sent should be rejected or made altogether subordinate. Some practical result should be demanded, not that theoretical and speculative treatment or assumed value under certain conditions may not be in the highest degree useful, even for an economic result anticipated, but that in an industrial exhibition what is known and proved should occupy the first and most important position.

An exhibition of mineral fuel I propose to call Class B, and it will properly follow that of ores and metals. Like its predecessor, it admits of subdivisions, which, however, are somewhat different, owing to the nature of the material. To the geological illustrations of the position of coal the series of specimens may succeed, and this, again, may be followed by illustrations of coal mining, methods of ventilating coal mines, contrivances for lighting mines safely, and practical suggestions for diminishing the fearful loss of life in this department of mining. Then may follow preparations of mineral fuel, for packing away the largest quantity of available fuel into the smallest space, and, lastly, the products of distillation of coal, of peat, or of other mineral fuel.

It will be evident that a considerable space must be occupied in the full exhibition of these minerals and the processes connected with them, although probably there will be no question as to who shall send the largest block of coal or the loftiest column of this useful mineral.

In Class C I propose to include all that group of minerals used on a large scale for general construction. Amongst them will be found building-stones and granite, slates, slabs, and flags, road stuff, and other material, of whatever kind that is hard, besides all varieties of clay used for bricks. fire brick, terra cotta, porcelain, and artificial stone. Under the same head would come cements and plasters, and processes for indurating and preserving stone. Together with or besides specimens which would be in all stages of preparation, the methods of quarrying, and also the methods of preparing the material for the market, and the cost of preparation should all be recorded.

The variety of hard stones used for constructive purposes in England alone is extremely great, and the varieties require to be seen to be at all appreciated. Every one knows, now when it is too late, how unsuccessful has been the well meant attempt to select a particularly good stone for the Houses of Parliament, and how little the united science and experience of chemists, geologists, architects, and masons could do fifteen years ago towards discovering the probable effect of a London atmosphere on a particular kind of stone. It remains to be seen whether the attention that has been drawn to the subject and the necessity of some remedial measure will produce the right remedy. No doubt in an Exhibition in 1862 there will be fair examples of stones left unprepared, and of others coated with various preparations, but it is to be feared that another decennial period must pass away before the favourite processes of the present day are fairly tried, and we can determine whether they answer their intended purpose or are, like the many that have preceded them, wanting in some essential character.

It would be a worthy employment of the means at the disposal of the Commissioners for the Exhibition if a selection were made of approved stones, some of them prepared, and other left in their natural state, for the purpose of testing in time the relative value of different stones in London. Either detached permanent constructions in the grounds at their disposal, or portions of that part of the building itself that is intended to remain as a permanent edifice would give ample opportunity for the determination of very important practical questions greatly affecting the beauty and stability of our public buildings.

In a fourth class (class D) I would suggest that there should be brought together a collection of the other minerals used in their natural state in the arts. These form a very large and important group, requiring subdivision. First there are the minerals, such as rough diamonds, emery of all kinds, whetstones of all kinds and polishing powder, (rotten stone and tripoli), employed for the purpose of cutting, grinding, sharpening, and polishing. Next we have lithographic stones, white and coloured chalks, French chalk, slates, and other substances used for drawing, writing, and engraving. Thirdly, there are all those minerals used without preparation, or with only a mechanical preparation as pigments for a direct colour, whether for drawing or painting, or for colouring glass or porcelain, or for coloured fireworks. Amongst these I would include various minerals used for bleaching or discharging colour, and as mordants for fixing colour. The whole form a sub-group which is natural and of considerable interest.

A fourth and last sub-group includes minerals used as food or for medical purposes as poisons, those used as cosmetics, those serving as fluxes in the reduction of other mineral ores or metals, a few that are useful in the process of enamelling and preparing factitious gems, together with others employed in dressing land and acting as mineral manure. A collection of this kind, though apparently miscellaneous, brings into a small space a multitude of minerals which ought to be seen, known, and understood; and which, being thus together, can be compared. Such comparison is in the highest degree favourable for obtaining suggestions as to the new uses of known things; and as in different countries there are certain common things that must be done, and local ways and means of doing them, we may find that some substances that we possess in abundance, and do not use, are really valuable and employed by our neighbours for purposes we have little idea of.

In all collections like those just alluded to there should be great attention paid to connect the raw material exhibited with its state as prepared for use, and, as far as possible, an illustration of the principal uses. It is in this way only that interest is to be given to accumulations of objects which in themselves would inevitably be passed with a mere hurried glance, even by those whose pursuits would induce us to expect a closer investigation.

Under another heading in Class E should be exhibited minerals forming the essential ingredient, in certain manufactures, but not of any use without considerable manipulation and admixture with other substances. A multitude of cases will seem difficult to arrange, except in such a group, minerals having, indeed, little in common, but not being without a capacity of being placed together with advantage. To instance a few, I may refer to the use of plumbago in making crucibles, of asphalte in pavement, of sulphur in the process of vulcanising caoutchouc, of flint in the manufacture of glass, of borax in making false gems, of gypsum and puzzuolana in making certain plasters and cements, of lapis lazuli in making ultramarine, of mercury in silvering mirrors, of the various metals that make important alloys by mixture, and a hundred other cases that would be tiresome to enumerate.

The difficulty in this class would be to exclude, but a line might be drawn to confine the objects admitted to those in which the mineral named was in the strictest sense the modifying ingredient.

In these five classes might certainly be placed almost, if not quite, all the minerals used in the arts on a large scale, but there still remain a considerable number, extremely valuable, and many of them wonderfully beautiful, capable of being worked into ornaments, and used for various purposes, for which there is no known substitute, and for the most part characterised by their crystalline condition. Such minerals are the gems or precious stones, various crystals used for optical and philosophical purposes, and a number of comparatively rare and valuable minerals made use of for artistic purposes.

The minerals thus left occur for the most part not only

TABLE 2.—METALS AND METALLIFEROUS MINERALS EMPLOYED IN THE ARTS AND MANUFACTURES.

Note.—Class B is mineral fuel, and has no representative in the List of Metalliferous Minerals.

FIRST DIVISION. SECOND DIVISION.

	Class A. Metals and Metalliferous Minerals used for the purpose of obtaining the metal.		Class C.	Class D. Minerals or metals used for sundry purposes.			Class E. Metals and minerals forming the essential ingredients in sundry manufactures.		Precious Metals and Minerals. Class F.	Class G.	Class H.	Principal Sources of Supply.
	Chemical state.	Technical name.	Minerals or metals used for constructive purposes, not strictly decorative, whether alone or combined as alloys with other metals.	Grinding. Polishing. &c.	Colouring purposes in dying, colouring glass and porcelain, pigments, &c., and for bleaching.	Sundries. Food and medicine, cosmetics. Fluxes to reduce enamel.	Name of mineral.	Manufacture.	Employed for personal ornaments, and purely decorative purposes in an unaltered or natural state.	Employed for sundry scientific operations and experiments, or processes in physical science.	Employed for sculpture mosaic, and other inlaid work, and generally in the fine arts and decorative manufrs.	
GOLD	Native.	Native gold.					Gold.	Plating. Coinage. Gilding.	Gold.	Gold.	Gold.	Australia. California. Siberia.
PLATINUM	Native.	Native platinum.					Platinum.	Chemical works utensils. Coinage.	Platinum.	Platinum.	Platinum.	Brazil and Peru.
PALLADIUM	Native.	Native palladium.					Palladium.	Plating.			Palladium.	Brazil.
RHODIUM	Native.	Native rhodium.					Rhodium.	Pen-nibs.				Peru.
IRIDIUM	Native.	Native iridium.					Iridium.	Pen-nibs.				Ural Mountains.
SILVER	Native. Sulphuret Chloride.	Native silver. Vitreous silver. Black silver. Ruby silver. Horn silver.	Silver.				Silver.	Various articles of domestic use. Coinage. Plating.	Silver.	Silver.	Silver.	South America, West Coast, and Mexico. Saxony and Hartz. Spain. Norway. Russia.
MERCURY	Native. Ditto, with silver Sulphuret.	Native mercury. Native amalgam. Cinnabar.			Cinnabar.	Native mercury. Calomel.	Mercury.	Silvering for mirrors.		Mercury.	Native amalgam.	Idria. Peru. Almaden. Chili. Palatinate. Spain. California.
COPPER	Native. Sulphuret Oxides Carbonate. Sulphate. Silicate.	Native copper. Vitreous copper. Copper pyrites. Grey copper ore. Red copper ore. Black oxide. Malachite.	Copper.		Oxide copper.		Copper. Oxide of copper.	Brass (Zinc) Bronze, Bell metal, Speculum metal } Tin. German silver (nickel). Verditer.	Dioptase. Euchroite. Azurite. Malachite. Chrysocolla.	Copper.	Copper. Bronze. German silver. Malachite.	Cornwall, Devon, and Wales. Cuba. Saxony. Silesia. China. Brazil. Australia. N. America. L. Superior. Australia. Spain. Ural Mountains. Cape of Good Hope.
NICKEL	Arseniuret.	Copper nickel.					Copper nickel.	Nickel.			German silver.	Saxony. Bohemia. Styria. China.
COBALT	Arseniuret. Oxide. Arseniate.	Arsenical cobalt. Bright white cobalt. Cobalt bloom.					Arsenical cobalt.	Zaffre. Oxide of cobalt. Arsenic preparations				Germany. Norway. Ural Mountains. United States.
IRON	Sulphuret. Oxides Carbonates Phosphate. Chromate. Silicate.	Magnetic oxide. Micaceous iron. Specular iron. Red hæmatite. Brown hæmatite. Spathic iron. Clay ironstones. Pisolite. Vivianite. Jenite.	Iron. Steel.	Red hæmatite.	Umber.		Iron pyrites. Iron oxide. Chromate of iron.	Sulphur. Chromate of potash.	Iron (fine castings).	Lodestone	Iron. Steel.	England, Wales, and Scotland. Ireland. France. Elba. Norway. India. Canada. United States. Styria and Carinthia. Nassau.

LEAD	Sulphuret. Carbonate. (Phosphate, Molydate.)	Galena. Cerusite.	Lead.	Carbonate of lead.	White lead.		Lead	Oxide of lead. Acetate of lead. Chromate of lead.		Lead.		England, Wales, and Scotland. France, Ireland, and I. of Man. Spain. Siberia. Saxony. Hartz. Belgium. United States.
TIN	Oxide. Sulphuret.	Tin ore. Bell metal ore.	Tin.	Tin putty.			Tin.	Cases for holding colours. Backs of mirrors (with mercury).		Tin.		Cornwall. Banca.
ZINC	Sulphuret. Carbonate. Oxide. Silicate.	Blende. Calamine. Electric calamine.	Zinc.				Zinc.	Brass (with copper). Zinc. Zinc white. Sulphuret of Zinc.		Zinc.		England. Belgium. Rhenish Prussia. Carinthia. Silesia. Poland. China. United States.
CADMIUM	Sulphuret.	Greenockite.					Greenockite.					Scotland.
BISMUTH	Native. Sulphuret.	Native bismuth. Sulphuret of bismuth.	Plumbers' solder.				Bismuth.	Plumbers' solder.				Saxony.
ANTIMONY	Sulphuret.	Grey antimony.				Grey antimony.	Sulphuret of antimony.	Hard pewter. Britannia metal. Type metal. Yellow oxide, medicine, fireworks, enamel, porcelain.				England. France. Borneo.
ARSENIC	Native. Oxide. Sulphuret	Native arsenic. White arsenic. Orpiment. Realgar.			Realgar (fireworks) Orpiment, staining wood.	White arsenic (poison) Realgar	Arsenic. Orpiment.	Shot metal. King's yellow.			Realgar.	Transylvania. Hungary. Turkey. China. America.
MANGANESE	Oxide Silicate. Manganite.	Pyrolusite. Wad. Manganese spar. Psilomelane.			Wad, coarse pigment glazing pottery ware. Oxides of manganese (glass) (dyeing) (bleaching) Manganese spar (glass & pottery)	Wad & other oxides of manganese as fluxes.	Wad. Peroxides of manganese.	Umber. Bleaching powder.	Manganese spar.	Oxides of manganese (Wad) (Psilomelane)	Manganese spar.	England and Scotland. Germany. France.
CHROMIUM	Chromate of iron	Chromite.			Oxide of chromium (glass and porcelain) (dyeing and calico printing)		Chromate	Chromate of potash. Chromate of lead. Oxide of chromium.				Scotland. N. America. France. India.
MOLYBDENUM	Sulphuret.	Molybdenite.			Molybdenite (porcelain)							
URANIUM	Oxide.	Pitchblende.			Pitchblende (porcelain)							
TITANIUM	Oxide.	Rutile. Anatase.			Rutile (porcelain)		Rutile.	Enamelling artificial teeth.				
TUNGSTEN	Tungstic acid. Tungstate of iron (or lime) and manganese.	Wolfram.			Tungstic acid (dyeing)		Various tungstates.	Tungstic acid.				
ALUMINIUM	Fluoride.	Cryolite.	Aluminium.						Aluminium.	Alumin.	Alumin.	Greenland.

TABLE 3.—EARTHY AND CRYSTALLINE MINERALS NOT METALLIFEROUS EMPLOYED IN THE ARTS AND IN MANUFACTURES.

Note.—Class A includes only metals and ores, and has therefore no representative in this list.

	FIRST DIVISION.									SECOND DIVISION.			
	Class B. Minerals used as Fuel.	Class C. Minerals used for Constructive Purposes not strictly decorative.		Class D. Minerals used for sundry miscellaneous purposes.				Class E. Minerals forming the essential ingredients in sundry manufactured articles.		Gems, precious stones, precious metals, and sundry minerals.			Principal Sources of Supply.
		Hard.	Plastic.	Grinding, cutting, sharpening, polishing, and other similar purposes.	Drawing, writing, engraving, &c., and other art purposes.	Pigments, and minerals used in dyeing, calico-printing, colouring glass & porcelain, and fixing or discharging colours.	Sundries. Food and medicine, cosmetics, &c., mineral manure, fluxes.	Name of minerals used.	Name of manufacture.	Class F. Used for personal decoration, and as gems for ornament only.	Class G. Used in optics, natural philosophy, and various scientific operations, and manufactures.	Class H. Used for sculpture, mosaic, cameos, and intaglios, and generally in the fine arts & for decorative manufacture.	
CARBON MINERALS	Anthracite Coal .... Lignite......	Cannel coal.		Diamond. Graphite.	Graphite.	Bitumen.		Graphite. Coal. Amber. Asphalte. Mineral pitch.	Crucibles. Gas, coal tar, &c. Lamp black. Pavement. Artificial fuel.	Diamond. Amber. Jet.	Diamond. Amber.	Jet. Diamond. Cannel coal. Amber.	
SULPHUR						Sulphur.	Sulphur, medicine.	Sulphur.	Gunpowder, vulcanising caoutchouc.		Sulphur.	Sulphur.	
QUARTZ MINERALS		Quartite. Millstone. Gritstone. Sandstone. Flint. Flagstone.		Grindstone. Scythestone. Touchstone. Honestone. Tripoli.			Sand, manure.	Quartz sand. Flints. Buhr stone. Flints (burnt).	Glass. Water Glass. Mill stones. Porcelain.	Amethyst. Rock crystal. Cairn gorm. Cornelian. Onyx. Sardonyx. Prase. Chrysoprase. Agate. Heliotrope. Jasper. Cat's-eye. Opal. Avanturine.	Brazil pebble Agate.	Crystal. Cornelian. Onyx. Sardonyx. Agate. Jasper.	
ALKALINE SALTS						Sal ammoniac. Natron.	Sal ammoniac. Nitre. Rock-salt. Natron. Borax.	Sal ammoniac. Nitre. Salt. Natron. Borax.	Soldering metals. Gunpowder & fireworks, glass making Soap making. Paste for false gems.		Rock salt.		

BARYTA MINERALS													
STRONTIA MINERALS													
LIME MINERALS.		Marble. Compact limestone. Oolite. Chalk. Alabaster. Magnesian limestone.			Chalk. Lithographic stone.		Chalk, manure Lime sand, manure. Phosphate lime manure.	Septaria. Gypsum. Lias lime. Coprolites or phosphatic nodules.	Cement. Plaster. Hydraulic cement. Artificial mineral manure.	Vulpinite. Satin spar.	Iceland spar. Selenite.	Marble. Fluor spar. Alabaster.	
MAGNESIA MINERALS (not Silicates)		Dolomite.	Meerschaum					Magnesite.	Meerschaum.				
ALUMINA MINERALS (Alumina, Hydrates, Sulphates, &c.)				Corundum. Emery.		Alum.				Ruby. Oriental sapphire. Oriental topaz. Oriental amethyst. Oriental emerald. Turquoise.		Prehnite. Agalmatolite.	
ALUMINOUS SILICATES		Slates. Slabs. Granite. Felspar.	Kaolin. China clay. Pottery clay. Pipe clay. Brick clay.	Polishing slate. Mountain meal Pumice.	Slates for drawing. Slate-pencils. Black chalk.	Ochres. Umber. Terra di Siena. Fuller's earth.		Red ochre. Bituminous shale. Puzzuolana.	Red chalk pencils. Bitumen, &c. Hydraulic cement.	Cyanite. Garnet. Iolite. Emerald. Beryl. Euclase. Moonstone. Labradorite. Amazon stone. Carbuncle.	Garnet.	Christolite. Garnet. Emerald. Beryl. Labradorite. Lava.	
NON-ALUMINOUS SILICATES		Potstone. Steatite. Talc. Serpentine.			French chalk.	French chalk.	Steatite, food.	Steatite.	Rouge.	Olivine. Peridote. Chrysolite. Zircon. Hyacinth.	Talc. Chrysolite. Zircon.	Steatite. Serpentine.	
SILICO-ALUMINATES, FLUATES, &c.								Mica. Lapis lazuli.	Window light Ultramarine.	Topaz. Tourmaline.	Topaz. Tourmaline. Mica.	Lepidolite. Lapis lazuli	
ALUMINATES ...										Almandine ruby. Spinelle. Balas ruby. Chrysoberyl.			

In consequence of Professor Ansted having been prevented by weather from reaching England in time to complete these tables, they are necessarily printed in a somewhat imperfect state, but still they serve to give a general idea of the principle of classification suggested.—[ED. *J.S.A.*]

in comparatively small quantity, but are greatly limited in their distribution. Thus, whilst coal in its various forms is happily distributed over the earth in large quantities, at intervals not very remote, diamond, the crystalline form of the same element (carbon), is one of the rarest, as it is the most costly, substance in nature. So also common clay, sand, and limestone, which are the component parts of every rock mass in all parts of the world, have, in their crystalline state, as ruby and sapphire, amethyst and opal, iceland spar and alabaster or statuary marble, totally distinct characters, values altogether disproportionate to the elements they respectively represent, properties to distinguish them from all other substances, and a rarity in their distribution singularly contrasted with the abundance of the commoner and more familiar forms by which they are known.

As it would manifestly be absurd to associate together substances so utterly unlike as coal and diamond, Iceland spar and Portland stone, millstones and Brazil pebbles, slates and rubies, yellow copper ore and encrusted work in polished malachite, it becomes necessary to establish a very decided line of demarcation, if we would fitly arrange an Industrial Exhibition. I propose, therefore, that a separate division should be established for ornamental, decorative, and other work in costly minerals, and that these should be kept apart from the general series, and be regarded as quite distinct. It seems to me that the whole might conveniently form three comparatively small classes: — one of them limited to gems and precious minerals, as used for personal ornament; a second including all those minerals used, on a small scale, in various departments of science, and some finer manufactures; while a third would refer to decorative manufactures and the fine arts. Of these the two first sufficiently explain themselves, and in the third it would not be difficult to effect a sub-division, according to which the uses of minerals for decorative art might be recognised and illustrated. The exquisite specimens of mosaic, both Florentine and Derbyshire—the encrusted work in malachite, from Russia—fine porphyry vases—sculptures in Egyptian—alabaster and marble, and other grand and beautiful work in mineral maaufactures, would then be seen not far removed from the diamonds, rubies, and other precious stones, while the stonework and slate, the bricks and tiles, the manufactures in fire-brick, and the draining-pipes and earthenware goods, would be removed from an association which adds to the interest of neither.

I feel the more at liberty to compare what I am satisfied might be done, and what may in some measure be effected in the next Exhibition with the weaknesses of the last Exhibition, because I had myself much to do with the original suggestions of the sub-divisions as arranged beforehand, and with the two classes then entitled minerals and mineral manufactures. My experience then obtained, and the interest I have since taken in the subject, must serve as my excuse for thus early requesting attention to it.

At the risk of being tedious, I must once more request attention to the salient points of the arrangement I hope to see adopted. They present two principal features:—First, that of combining the foreign with the British collections, and next, that of combining the manufactures with the raw material; on the other hand, they tend to separate the useful minerals, employed on a large scale, from the ornamental minerals, used for personal and other decoration, and on a small scale. In this respect they admit of arrangement in an easier way, with much more striking effect, and, I venture to submit, with much greater prospect of a useful and lasting result than was the case in the last Exhibition.

One word now in respect to the advantage to be derived from exhibiting series such as have been alluded to, and the mode in which they must be obtained for exhibition. The useful minerals are, as I have already mentioned, comparatively few in number. They are also remarkably limited in distribution, some being really confined to particular districts, others only known in the countries in which they happen to have attracted attention. The localities in which fine china and porcelain ware are manufactured are even now singularly few in number; each place has its own branch of manufacture, and each country that manufactures, also imports or ought to import largely from the others. The manufacture in question is almost beyond others a mineral manufacture. The materials used are china clay, china stone, flints, and some other minerals for the body, metallic oxides and other minerals for the colouring matter, and certain minerals for the glaze. The manufactured clay is burnt with mineral fuel, and the furnace is constructed of fire-brick. Now, in all these uses of minerals, each country has its own method, but in exhibiting and comparing porcelain, the varieties of mineral used have hardly been enough considered, and the causes of essential differences have escaped notice. The advantage of showing the materials and progressive steps of manufacture side by side, so as to enable the British manufacturer to see and understand the cause of the difference between Staffordshire and Worcestershire goods, and those from Sèvres and Dresden, from China and Japan, is not trifling, and all parties would be benefited by the interchange of knowledge.

But this illustration in the case of porcelain is but one example out of a number equally good. Other mineral manufactures are capable of illustration in a similar way, and other manufacturers might avail themselves of opportunities offered for comparing methods. These opportunities have not been afforded yet by any of the great Exhibitions, for in our own of 1851 it was not possible, as we have seen, to make this comparison, while in that of Paris which followed, no attempt at general arrangement seems to have been made.

It may be feared that even now there is neither time nor opportunity for a general principle of classification to be carried out in the coming Exhibition. I trust it is not so, and that on the other hand method will be recognised as the great and ruling characteristic. To enable any plan to be carried out properly, two things should be done. There should be a definite scheme for each department, and a calculation of the nature and kind of space required in every case. Careful lists of desiderata should be prepared beforehand, and direct solicitation made in the proper quarters for the particular objects required and no other. Where necessary this solicitation must be personal, and must ensure the needful supply of the progressive steps of manufacture. In every department there should be one ruling power entrusted to carry out a plan, and not merely to accept and place everything sent.

It will inevitably result that should any systematic plan be adopted, different departments will overlap—that, for example, the progressive and illustrative Exhibition of porcelain in the department of mineral manufactures will be to some extent a repetition of what will be exhibited in ceramic manufactures, and so in other cases. I do not think this any objection in principle, and I do not believe it would involve any difficulty in pactice. Certainly it would not cause the vast consumption of space which is sure to be occupied in the absence of system by an indefinite repetition of similar objects, many of them not remarkable for novelty or excellence. The permission to exhibit might be accorded to towns or districts, or countries to a limited extent (a certain number of superficial yards), with the understanding that certain manufactures or raw materials of the best kind there obtainable should be forwarded by a given time. The placing and arranging of these should be confided to appointed and responsible officers. Should it happen that the quantity promised is not sent, or the quality is not approved, there would be little difficulty in most cases in replacing the articles expected by some others, but if not, it would be better that blanks should be left than that rubbish should be exhibited.

It will be evident that the idea of arrangement I suggest supposes an active and energetic officer understanding his subject to superintend each department. The experience

of former occasions proves that such persons are to be found when required, but to be of much use, their work must commence much earlier on this occasion than before, and the method adopted be to some extent systematic, throughout the whole Exhibition. I have not ventured in this communication to offer remarks on other departments than those in which my experience has been chiefly gained, but to some extent what I have said is generally applicable, and the principles I advocate will hold good as much for one department as for another.

The accompanying tabular forms are drawn out with a view to show in outline how far the minerals used in the arts, and the mineral manufactures they are employed in, admit of being systematised. With some additional trouble, and the assistance of those who are directly concerned in the various departments, it would be possible so far to complete them as to render them useful in carrying out a plan like that I have proposed. Without some tabular views of the kind, I hardly think that a proper system could be devised.

DISCUSSION.

Mr. HENRY COLE, C.B., remarked that it must be gratifying to the Society that the first paper read upon the approaching International Exhibition should have been brought before it. He hoped this was only the first of a series of discussions upon this important subject. This Society, on the present, as well as on the former occasion in 1851, after a great many difficulties, had succeeded in fairly launching a great Exhibition. He was sorry Professor Ansted was not present, because the observations he should feel it his duty to make would be such as he should like to have heard answered by that gentleman. He should regret that a paper like this should go forth with any kind of authority from the Society, as setting forth principles on which it might be desirable to carry out the mineral portion of the Exhibition. He collected from the paper that the Commissioners and their *employés* were to do all the work and the exhibitors none. There were many passages which implied that some kind of despotism was to be exercised over everything that was brought to the Exhibition; that the exhibitors themselves were to come like lambs, and place their objects before the Commissioners, and that the Commissioners were to engage the services of some eminent despotic scientific gentlemen, who were to exercise unlimited powers. He observed that towards the end of the paper that principle was distinctly laid down—that the placing and arranging of these objects should be confided to appointed and responsible officers. Having had some considerable experience in the first Exhibition, he would say that the most suitable persons in his opinion for arranging the articles were the exhibitors themselves to whom they belonged. If he were an exhibitor of mineral manufactures, he should prefer to have the responsibility of disposing of them himself, rather than entrusting them to any officer of the Commission. He believed whatever success attended the first Exhibition resulted mainly from a steady maintenance of the principle of non-interference. It would have been quite impossible on that occasion—and he was certain it would be equally so on the present—for any body of Commissioners or scientific men to do the work which the manufacturing interests of the country could do far better for themselves. Let them try and realise what an Exhibition was. Objects were brought hastily together, often under great difficulties, and under very different conditions from those which applied to museums. He should have been disposed to have taken but little exception to the paper if the suggestions had been confined to the arrangement of the mineral productions only, and not the manufactures. Indeed, he thought it quite consistent that some degree of censorship should be exercised as to whether certain objects should be accepted or rejected, but to imagine that they would dip their hands first into a French package, then into a Russian package, and then into a British package, and from each pick out the particular articles they wished to exhibit, and bring them altogether, was quite absurd. He thought it was a complete dream, the attempting to manage an Exhibition except by the voluntary labour of all the exhibitors. They would recollect the very remarkable state of things in the Exhibition of 1851, when five or six days before it opened everything seemed like chaos. People were going about here and there like bees in a hive; nobody looking on could tell what they were doing, or where they were going. They had in that building 14,000 people at once, all actively employed, and each doing his own work. The afternoon before the opening, the Queen expressed her great surprise at the confusion apparently existing; but the next morning by eleven o'clock the whole place was like a drawing-room. And why? Simply because 14,000 people were each doing his own particular work, and doing it in the best possible way. If, instead of these 14,000 simultaneous workers, the same task had been confided to a staff of officers, however competent, what confusion it would have created. It appeared to him perfectly chimerical to expect to get the work of an exhibition done in that way. No doubt something was to be said upon the general principle of arrangement whether it should be geographical or scientific. No doubt, in arranging a museum they would in all cases bring like things together, and they would have plenty of time to do the work; but in an Exhibition which was to last only for a few months, and where there were a multitude of interests, unless they kept those interests somewhat together—for instance, unless they could keep the French portion of the Exhibition together, and the German portion also together, what confusion there would be? There was no doubt that each national collection would be exhibited more or less with a certain amount of national peculiarity. If all were mixed together, the nationality, which was a matter of interest in itself, would be entirely lost. In saying this he did not mean to say that they should place French machinery in motion with Lyons silks or Sèvres china, but as far as possible the principle of nationality should be kept in view, and the exhibitors of each country should be entrusted with the management of their own articles. It would be within the recollection of the members of the Society, that soon after the Exhibition of 1851, it was felt that a system of classification, based upon objects, presented such inconveniences that a different arrangement was proposed—that instead of taking objects they should take producers. They would see how rational that was. They wanted the objects, but they must first find the men who produced the objects, and it was indispensable that the producer of the article should be in charge of his own goods. He laid it down as a canon that if they wanted an Exhibition they must charge the exhibitor with the arrangement of his own property, and the rule must be observed that the goods of an exhibitor should not be divided unless he consented to the division. If the manufacturers of Coalbrookdale sent a large ornamental statue for exhibition in some portion of the building, that would be an exception. Upon the whole, he thought the classification in 1851 was as reasonable as might be expected, though it might perhaps be a little amended; but he did not think it was much amended in the Paris Exhibition in 1855. The scientific advisers of the Commissioners in 1851, however, did what Professor Ansted advised them—they took the objects and did not take the exhibitors. Some instances arose in which the classification was completely violated. As an illustration of this, he would take the manufacture of colours, which were made from mineral, vegetable, and animal substances; but all came under the class of pigments. According to the classification they ought to have cut up that manufacture into three or four pieces, animal colours with animal substances, vegetable colours with vegetable, and mineral colours with mineral; but that was not done, simply because the exhibitors would not allow their articles to be so dealt with. He thought

the great principle to be followed in this matter was to make it as strongly as possible the interest of exhibitors to bring forward their goods. Why did they send their goods to exhibitions? Simply to show what they had done during the last ten years, and to illustrate the progress which had been made during that time. If the Commissioners attempted to do the work of the exhibitors they would not succeed in doing it well; the more they left individuals to do their own proper work, the more successful he believed the approaching Exhibition would be.

Mr. Robert Hunt, F.R.S., said the fixedness of the impressions upon his mind, with regard to the Exhibition of 1851, led him to offer a few remarks upon this subject. Mr. Cole had, he thought, very correctly objected to the system of classification which had been proposed by Professor Ansted. He (Mr. Hunt) did not believe, from his own experience, that it could be practically carried out. At the same time he could not but admit that there was some advantage in starting with a fixed plan which was based upon scientific and educational principles. He was perfectly satisfied that if, in the Great Exhibition of 1851, they had had more time to do the work, the classification of the minerals there would have been much improved. It would be remembered that in the first instance there was some doubt whether raw materials should be exhibited or not, and on that account that portion of the Exhibition was driven off till the latest moment. Professor Ansted had, in his opinion, said truly it was most desirable to exhibit the raw material, the processes of manufacture and the results of manufacture, as much as possible together. To a certain extent that could be done, and was done in some degree in the Exhibition of 1851. Professor Ansted had, he thought, alluded too slightingly to the collection of iron ores then shown. A more perfect collection of the iron ores of Great Britain than that exhibited by Mr. Blackwell, in 1851, could not be brought together. Immediately in connection with the manufactures of iron, might be placed illustrations of the processes of manipulation of the metal, not merely into pig-iron, but also into bars and rails. Up to that point they could comprehend the manufactures in one particular class; and it appeared to him that in carrying out the Exhibition of 1862, they might render it more educational than that of 1851 was, by determining in the first instance to obtain from all the mining districts of the United Kingdom specimens illustrating the productions of each particular district, which might be systematically arranged, and in connection with them there might be exhibited illustrations of the processes of mining, which was not the case in 1851. He thought it was an important thing at this early period, when they had time for doing the work properly, to endeavour to get foreign governments to furnish models of the machinery employed in their mining operations. Nothing could be more valuable or instructive to the mining population of this country than bringing together such a class of models. He was quite sensible of the wide difference there was between an exhibition of this kind and a museum, and he was aware that in carrying it out they had not merely to consider its educational but its popular character, for it would be visited by many thousands. He thought men of science might be very usefully called upon to consult with the Commissioners as to the classification of the objects, by means of which the approaching Exhibition would not only be made popular, but also an educational and instructive one to the country.

Mr. Thomas Jones, as an exhibitor in 1851, would remark, that in the department in which he was interested there was great dissatisfaction amongst the exhibitors with regard to the jurors appointed for the supervision of it. He thought in future exhibitions the appointment of the jurors should be made by the exhibitors themselves, if rewards and commendations were to be issued at all. The sort of despotism which had been alluded to was what he (Mr. Jones) would not submit to again. He thought many of the suggestions of Professor Ansted might be usefully communicated to intending exhibitors in the different classes, and if those classes were arranged under the superintendence of a qualified person, appointed by themselves, there would be carried out that scientific classification and educational arrangement which was advocated by Mr. Hunt.

Mr. N. S. Maskelyne concurred to a great extent with what had fallen from Mr. Cole, and he believed a scientific arrangement of the various articles exhibited could be more conveniently carried out in the way that gentleman had suggested than by the plan laid down by Professor Ansted, if left very much, though not entirely, to the persons who furnished the articles for exhibition. With regard to the nature of the exhibition they should endeavour to obtain, he thought a proper representation of the mining wealth and industry of the country ought to be made a prominent feature, and the value of such an exhibition would be enhanced by representations of the machinery employed in such operations at the present period. With regard to minerals, he might remark that there was scarcely a capital in Europe which did not possess valuable collections of mineral products—each one rich in some particular class of mineral, which would be highly interesting if brought before a larger world than that which generally saw them. He thought the governments of those countries might readily be inclined to lend their most choice collections for the approaching Exhibition. They might, with a little management, borrow the unique collections of minerals which enriched such capitals as St. Petersburgh, Vienna, Madrid, Turin, &c., and he believed all those collections could be brought together so as to form a leading feature in the forthcoming Exhibition. The question was, how was this to be done? The best means he could suggest was to communicate with those who had charge of these collections, and he did not know a person more qualified for that task, by his European reputation, than Professor Miller, of Cambridge, whose large knowledge of such collections, and where they were to be found, rendered him the most eligible person to make the communications he had suggested. The next feature of the Exhibition should be the great mining interest, which was the substratum of every great manufacturing industry in this country, and in the world. He differed from the so-called scientific arrangement of this department, suggested by Professor Ansted, for the reasons which had been so well explained by Mr. Cole. The question was, how were they to secure the co-operation they wanted, not the co-operation of the scientific man, but of the producer, and whilst he had taken upon himself to suggest the name of a gentleman in connection with the mineralogical collections, he would add the name of another whose reputation and standing as a mining engineer were of the highest order, viz., Mr. Warington Smyth, and he had no doubt Mr. Hunt was himself in a position to render valuable aid in this matter. He believed by such means as he had suggested, they would be able to bring together in the approaching Exhibition such a collection of mineral treasures as the world had never seen. With regard to the arrangement of such collections, he considered that to be a matter of secondary importance. The great thing was to get the collections together. He believed such an exhibition in this department would form a most attractive feature in the great national undertaking in which they were now embarked.

Mr. P. L. Simmonds said, that notwithstanding the objections which had been urged by Mr. Cole, he did not think there were insuperable obstacles to the consideration and possible adoption of some of the suggestions of Professor Ansted, which would materially enhance the forthcoming Exhibition in an instructive point of view, without detracting at all from its general attractions and commercial success. The adoption of some of the suggestions could be carried out without either offending the exhibitors, or withdrawing the arrangement or custody out

of their hands. The International Exhibition of 1862 would differ from the previous ones in many respects, especially in the experience gained—the new features introduced, and in that it was intended to measure the progress and improvement that had been made in various departments by comparison with the past. Inasmuch as the Commissioners already drew out classifications, arrangements, and general instructions for intending exhibitors, there seemed nothing unreasonable in their also offering some suggestions as to the mode in which specimens or collections might be best shown. Without breaking up geographical or special local collections desirable to keep together, it was still possible to obtain smaller duplicate specimens which could be arranged in general groups, so as to afford easy comparisons of the nature and qualities of ores, metals, fuels, building stones, and partially manufactured products from different localities in the particular class under discussion, and very many others. Such an arrangement would greatly facilitate easy reference, and promote the interests of manufacturers, who, in 1851, had the greatest trouble in making an inquisitive survey over the various bays, to ascertain what was shown of the particular kind in which they were most interested. How desirable, for instance, it would be to show not only the samples, but the sources of the various oils, vegetable and mineral, together with their applications; to compare also the coal of different parts of the world, seeing how important this fuel was, now that ocean and river steam communication, railroads and stationary engines were so widely extended. The mineral collections of the Exhibition of 1862 promised to be of a highly important character, looking at the great discoveries of gold, silver, mercury, malachite, sulphur, &c., in new quarters since 1851—the widely extended uses of iron, the manufacture of aluminium and other metals, the extended production of and trade in nitrate of soda, borax, &c., and the large application of mineral manures to the soil. There were many countries quite unrepresented on the last occasion, and there were many eastern countries with which we had of late years entered into intimate trade relations, which could exhibit much that was novel and useful; and these products it would be highly desirable (especially as regarded raw materials) to place, if possible, in juxtaposition with those of European countries.

Mr. Thomas Hilton remarked that there was one point in reference to Professor Ansted's classification of mineral products which it was probable the Exhibition of 1862 would suggest. There was a material only recently brought into use, called the Torbane Mineral, from which two descriptions of oils were manufactured—one for lubricating, and the other for burning purposes, besides a solid, inodorous, translucent substance suitable for the manufacture of candles. Supposing the classification of Professor Ansted were adopted, the owner of the Torbane Mineral would find his production, which was in the natural state a black, coal-like substance, side by side with the elegant paraffine candles. The same remark might apply to the tarry products derived from the manufacture of gas, which were employed in three or four different manufactures; and when they came to the colour trade, the remark applied with still greater force. In this case they had a combination of animal, vegetable, and mineral products, and in that instance such a classification as Professor Ansted proposed could not be adopted.

Mr. Harry Chester had listened with interest to Professor Ansted's paper, and also to the observations which had fallen from the different speakers, though he could not but express his regret that such a paper had been read at this especial period. It seemed to him that it should have been read either a great deal earlier or much later; in the latter case as a criticism upon what was past, or in the former with the view of influencing the decision of the Commissioners for the Exhibition as to what should be done. All he could say was, that the management of this great undertaking had been entrusted to five gentlemen well qualified in all respects for the duty. A long period had elapsed since they were asked to undertake that task, and many months had passed since they had publicly signified their acceptance of the trust. It was not to be supposed that during all that time they had allowed their minds to lie idle upon the great subject of classification. Those gentlemen were connected with the Great Exhibition of 1851, and they knew that the managers of that exhibition had recorded their experience in the most careful manner, and had recorded also suggestions for improvements in the future. They had, therefore, on entering upon their duties not only a complete record of what was done in 1851, but also of what in the judgment of men of experience might be better done in 1862. He, therefore, could not conceive that so important and fundamental a question as that which they were now discussing had not been already decided upon by the Commissioners; and if that were the case, any suggestions of this kind, put forth at this stage, might only tend to embarrass them. There was to his mind considerable difficulty in carrying out the scientific arrangement which Professor Ansted suggested. All who heard him (Mr. Chester) would, he was sure, give him credit for entertaining an anxious desire that the Exhibition of 1862 should be of as educational a character as possible; but he was convinced that in order to make it educationally useful, they must in the first place make it successful commercially. The first thing to be done was to obtain the co-operation of the exhibitors, and the next thing was to present the objects sent for exhibition in a popular and interesting aspect. Let them make it as philosophical and as educational as they could, but they must not sacrifice commercial success to any theories of philosophy or education. He had the fullest confidence that in the hands of the Commissioners, the forthcoming Exhibition would be a great improvement upon its predecessor of 1851.

Mr. Waterhouse Hawkins entirely sympathised with the observations of Mr. Chester as to the measure and style of congratulation that ought to be afforded to the Society on account of the first paper upon this subject having been addressed to an audience in this hall. It could not fail to give an impression that it came in some degree with the Society's sanction, and he thought it was to be regretted that the paper ignored the two essential features of the coming Exhibition, viz., internationality and the individuality of the exhibitors themselves. The mere announcement that it was to be an International Exhibition would create the desire in each nation to exhibit the best things they possessed, and these would be brought as voluntary offerings from the competitive spirit which such an exhibition was calculated to create. Thus every nation would make the best show it could, provided always that there was no scientific despotism established for the arrangement of the productions. Not that he undervalued scientific classification, and nowhere would this be seen more perfectly carried out than in our national mineralogical collection in the British Museum. They had there an illustration of the manner in which science laid forth those treasures of the earth for educational purposes. But an exhibition of the character now contemplated was mainly intended to stimulate the industrial energy of the whole world. By his experience of past exhibitions, and having had the pleasure of serving under Mr. Cole, in 1851, he was convinced of the entire practicability of that gentleman's observations that evening. The Exhibition should be carried out without coercing and dragooning the exhibitors, or he was certain there would be a failure in 1862 which did not appear in 1851.

Mr. Davis, as being connected with one of the largest mineral properties in the kingdom, would express his thanks to Professor Ansted for his paper, for the simple reason—if for no other—that it had ventilated the subject. If the Commissioners could be induced to issue some general statements of the course they intended to pursue, it would be a great advantage to intending ex-

hibitors. He thought the proceedings of the Royal Agricultural Society afforded a good example to be followed in this case. In an Exhibition they wanted not science alone, but science combined with practice. As a practical man, he agreed with the remarks of Mr. Cole. No exhibitor in the iron or coal trade would consent to send his materials to be dealt with by a scientific officer just as it pleased him. Each person would say he knew best what to exhibit and how to exhibit it. They could not suppose that men went to the trouble and expense of preparing articles for exhibition merely for the sake of science. It was for the sake of profit, and they exhibited articles which they thought would catch the public taste, hoping to repay themselves tenfold for the expense they had been at. As one interested in manufactures, he protested against articles being handed over to scientific men for arrangement. Exhibitors would, of course, be happy to conform to all the general regulations, but let them be allowed to exhibit their goods in their own way.

Mr. Battley apprehended that the Commissioners for the Exhibition of 1862 were in no way pledged to the suggestions contained in Professor Ansted's paper. He had no doubt that every opportunity would be offered to exhibitors to display their articles in the best manner.

Professor Tennant was sorry Professor Ansted was not present to answer some of the observations which had been made. Much valuable information had been brought before them in this paper, but they were in no way bound by the suggestions made, for they only amounted to suggestions. With reference to the classification of minerals in the forthcoming Exhibition he did not anticipate any failure, if it were left to the judgment and perseverance of the exhibitors themselves. He agreed with many of the remarks of Mr. Cole, who had a large experience in these matters. He (Professor Tennant) was decidedly favourable to the illustration of the processes of manufacture from the raw material up to the finished article; and however often these might be repeated they would suggest ideas of improvement to manufacturers. With regard to the practical benefit of these exhibitions, he could mention the fact that in 1851 a large iron master in South Wales, upon inspecting the exhibition of raw materials, discovered that he had been throwing away an enormous quantity of a valuable article every year. That was spathose iron ore, from which some of the finest quality of iron was manufactured.

Professor Morris remarked that the paper of Professor Ansted was of value for the suggestions it contained, though he thought it probable that the plans of the Commissioners were already matured. He thought in all these matters the *laissez faire* principle was the best. With regard to the mineral department, it appeared from what had fallen from some speakers, that fear was entertained of its being made too general. There were two great classes of minerals—one in the crystallised form, of great beauty and rarity, and the other in the earthy form, useful in the industrial processes of commerce. He thought if exhibitors drew attention to the raw materials which might be overlooked by the mass, they would be doing more benefit to commerce than by collecting the more costly and rare crystallised substances from the museums of the world. Many valuable discoveries in the properties and uses of minerals had been made since the Exhibition of 1851, and therefore he thought it was the particular substances which had turned out to be of most value for arts or manufactures which should have the greatest prominence given them in the forthcoming Exhibition. He thought a geographical arrangement would be to some extent useful, if the objects were grouped under the ordinary conditions in which they were met with in nature. The subordinate arrangement of the collections might very well be left to the judgment of the exhibitors themselves, the general principles by which they were to be governed having been first decided upon.

Mr. J. H. Murchison could not refrain from expressing his surprise that in an assembly like this, composed of scientific gentlemen, science as applied to manufactures and commerce should be so lightly treated. Was it not the object of this society to promote manufactures, by encouraging scientific men to favour them with their views and opinions, and thus to enable manufacturers to bring their productions into a more perfect state? Where would our manufactures be without the aid of science? He regretted that Professor Ansted was not present to explain away some of the misconceptions which his paper appeared to have given rise to, and he thought if gentlemen had carefully listened to the paper they would not have made some of the statements they had made that evening. It had been asked for what purpose the forthcoming Exhibition was to be held? Whatever might have been the object of the Exhibition of 1851, the one in 1862 would require a more systematic arrangement than the former one. He apprehended the great purpose was to show the progress which had been made in the manufactures of this country when placed in juxtaposition with those of foreign nations, and he thought the suggestions of Professor Ansted upon that point could scarcely be disregarded in carrying out the Exhibition of 1862.

The Chairman was quite sure that in the consideration of a paper such as that with which they had been favoured with by Prof. Anstead, only one opinion could exist among them, and that was that the suggestions he offered were well worthy of discussion. In his opinion the proper representation of the mineral department of the Exhibition was of the utmost importance to this country, whose prosperity was entirely based upon its mineral productions. He agreed with Mr. Cole, that it would be impracticable to take the various articles from the producers of different countries, and submit them to sub-division and re-arrangement; but he thought the discussion of that evening might be turned to profitable account if it conveyed to intending exhibitors some general idea of what was to be realised. There were several circumstances which tended to give additional interest to the approaching Exhibition; amongst others might be mentioned the vastness of the building to be erected. They were accustomed to speak of areas by the square yard, but buildings for exhibitions were calculated by the acre, and he understood that the area of the Exhibition of 1862 would be two acres larger than that of 1851. He would remark generally, with regard to the arrangement of the Exhibition, that in his opinion some attention should be paid both to the geographical and geological conditions of the various mineral productions. He would point to the Museum of Practical Geology, in Jermyn-street, as the perfection of all they could desire in its arrangements, and he did not think any better model could be found for the representation of practical mining than that institution afforded. With regard to the gathering together of large mineralogical collections, however desirable and interesting, it might be, he feared that such collections from distant countries must be confined to the more remarkable specimens; but that such specimens would be brought he had no doubt, from the competitive spirit alluded to by Mr. Waterhouse Hawkins. The Chairman having alluded to the characteristics of the mineralogical department of the Paris Exhibition, and having spoken in favour of illustrating this department by drawings of the processes of manufacture accompanied by maps and sections, concluded by proposing a vote of thanks to professor Ansted for his paper.

A vote of thanks was then passed.

The Secretary announced that on Wednesday evening next, the 20th inst., a paper, "On the Economic History of Paraffine," by Mr. Charles Tomlinson, would be read.

Proceedings of Institutions.

WELCHPOOL READING SOCIETY.—In the report for the year ending 31st December, 1860, the Committee say that they are not aware that any circumstances have arisen during the past year to call for special notice. Various causes have naturally occasioned the loss of many who assisted in establishing the Institution, and the Committee much regret that fresh subscribers have not come forward in equal numbers to supply their places. The consequent decrease of income has delayed many additions to the library which are much needed. The Committee can, however, point with satisfaction to the present condition of the finances, and hope that they shall soon be able to make improvements which will render the Society still more useful and attractive. It is proposed to lay out a large portion of the balance in hand in the purchase of new books, and it is hoped that the increased facilities of railway communication will shortly enable the Committee to supply the subscribers with the morning papers on the day of publication. The financial statement shows that the receipts have been £94 7s. 10d. and the expenditure £64 0d. 9d., leaving a balance in the treasurer's hand of £30 7s. 1d.

MEETINGS FOR THE ENSUING WEEK.

MON. ...Royal Inst., 9. Mr. P. B. Chaillu, "Personal Narrative of Travels in Western Central Africa."
British Architects, 8.
Medical, 8½. Clinical Discussion.
R. United Service Inst., 8½. Capt. E. P. Halsted, R.N., "On Iron Clad Ships."

TUES. ...Royal Inst., 3. Professor Owen, "On Fishes."
Civil Engineers, 8. Discussion upon Mr. Murray's paper "On the North Sea or German Ocean."
Statistical, 8. M. de Parieu, "On Taxes on Enjoyments." (Jouissances.)
Pathological, 8.
Ethnological, 8½. 1. Dr. Robert Knox, "On some Ancient Forms of Civilization." 2. Mr. W. Parker Snow, "A few Remarks on the Natives of East Australia, and the Wild Tribes of Tierra del Fuego, with specimens of their workmanship."

WED. ...London Inst., 7.
Meteorological, 7.
Society of Arts, 8. Mr. Charles Tomlinson, "On the Economic History of Paraffine."
Geological, 8.

THURS...Royal Inst., 3. Prof. Tyndall, "On Electricity."
Zoological, 4.
Philological Club, 6.
Numismatic, 7.
Linnæan, 8. 1. Mr. A. Newton, "On the Possibility of taking a Zoological Census." 2. Mr. F. Smith, "On some new species of Ant from the Holy Land." 3. Mr. T. West, "On the Structure of the Feet in Insects."
Chemical, 8. Dr. Williamson, "On Thermo-dynamics in relation to Chemical Affinity."
Royal, 8½.
Antiquaries, 8½.

FRI.... ..R. United Service Inst., 3. Captain Ward, R.N., "Life Boats."
Royal Inst., 8. Prof. H. D. Rogers, "On the Origin of the Parallel Roads of Glen Roy."

SAT. .....Royal Inst., 3. Dr. E. Frankland, "On Inorganic Chemistry."
Royal Botanic, 3¾.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, March 8th*, 1861.]

Dated 29th October, 1860.

2646. A. S. Stecker, Wolverhampton—Imp. in the manufacture of horse and other shoes, and in the machinery or apparatus to be employed therein, part of which imps. are also applicable to metal boot heels and various other articles.

Dated 12th January, 1861.

92. Hon. W. E. Fitz Maurice, 12, Hyde park-gate—Imp. in generating heat for locomotive, marine, and other boilers and furnaces.

96. M. V. Boquet, 224, Rue de Rivoli, Paris—An imp. mode of stoppering or closing canisters, bottles, or other vessels.

Dated 21st January, 1861.

166. J. B. Pascal, Lyons, France—Imp. in generating burning gases to be applied as a motive power, and in apparatus for the same.

Dated 29th January, 1861.

232. J. Robertson, Upper Newington, Mount Pleasant, Liverpool—An imp. or imps. in sewing machines.

Dated 2nd February, 1861.

284. W. Clark, 53, Chancery-lane—Imp. in instruments for testing the alcoholic strengths of liquids. (A com).

Dated 5th February, 1861.

296. F. Jeffrey, Guildford, Surrey—An improved tumbler lever and body, applicable to double and single breech loading guns.

Dated 11th February, 1861.

348. R. A. Brooman, 166, Fleet-street—An improved gas apparatus, intended chiefly for lighting pipes, cigars, and cigarettes. (A com.)

Dated 14th February, 1861.

380. H. D. P. Cunningham, Bury, near Gosport—Imp. in sails and in the rig of ships and vessels.

Dated 16th February, 1861.

390. J. Walker, Rhodes, near Manchester—Imp. in the manufacture of soles for clogs and other coverings for the feet, and in the machinery employed therein.
392. J. Horn, Whitechapel—Imp. in machinery or apparatus for the manufacture of bitumenised paper pipes, and other similar articles.
394. T. Settle, Bolton—A certain imp. in machinery or apparatus employed in preparing cotton, wool, flax, and other fibrous substances for spinning.

Dated 18th February, 1861.

396. J. Womersley, Norwich—Imp. in paper-making machines.
398. F. Schafer, Golden-square—An imp. in travelling bags and in frames for the same.

Dated 19th February, 1861.

402. A. Carter, Langley-place, East India-road, Poplar—An improved stadium or telemetre.
404. J. Browning, Minories—Imp. in telescopes and in covers for the object thereof.
406. T. Pedrick, 8, Brighton-terrace, Brixton—Imp. in obtaining and applying motive power by water, and in apparatus connected therewith.
408. W. Clark, 53, Chancery-lane—Imp. in the preparation of alkaline and earthy cyanides. (A com.)
410. A. V. Newton, 66, Chancery-lane—An improved mode of coupling the rails of railways. (A com.)
412. W. E. Newton, 66, Chancery-lane—Imp. in the construction of guns, and in loading and firing the same. (A com.)
414. A. Turner, Leicester—Imp. in preparing warps for the manufacture of elastic fabrics.

Dated 20th February, 1861.

418. C. Smith, Manchester—Imp. in machinery or apparatus for cutting or shaping soap or other similar materials.
422. G. Parsons, Martock, Somersetshire—Imp. in the construction of wheels.
424. T. Richardson, Newcastle-upon-Tyne—Imp. in the manufacture of manure.

Dated 21st February, 1861.

425. J. Louch, 69, Fenchurch-street—Imp. in furnaces.
427. C. Maschwitz, jun., Birmingham—A new or improved tap or stop cock for liquids, steam, and gas.
429. J. Moon, Bedford row, Middlesex—Imp. in means or apparatus for closing the passages of the chimneys from stoves and other fire places.
430. J. J. Miller, jun., Clarendon-place, Vassall-road, Brixton—Imp. in apparatus for governing or regulating the speed of steam and other engines or machines.
431. J. Longshaw, Manchester—An improved method of applying breaks to the wheels of railway and other carriages.
432. W. E. Newton, 66, Chancery-lane—Imp. in centrifugal governors for marine and other steam engines and other motors. (A com.)
433. W. E. Newton, 66, Chancery-lane—Imp. in breaks applicable to railway carriages. (A com.)
435. D. Evans, Stratford, Essex—Imp. in the manufacture of railway and other wheels.
436. W. Watson and A. Watson, Whitehaven—Imp. in machinery or apparatus for casting bullets.
437. J. H. Johnson, 47, Lincoln's-inn-fields—The application of certain vegetable substances to the manufacture of paper pulp, and the mode of treating the same for that purpose. (A com.)

Dated 22nd February, 1861.

439. B. Lang, Skinner-street, Snow-hill—Imp. in apparatus for feeding infants and invalids.

440. A. Crookes and H. Roberts, Sheffield—An imp. in Doctor's calico webs or scrapers, used in the process of printing calicoes, muslins, and other textile fabrics
441. A. L. Cole, United Service Club, Pall-mall—Imp. in fire-arms.
442. J. B. Mannix, 21, Torriano-grove, Kentish-town—An improved method of applying springs to railway and other carriages.
443. H. G. Prossor, Waterford—Imp. in the mode of, and apparatus for, singeing the hairs from off the carcasses of pigs.
444. H. G. Prossor, Waterford—Improved apparatus to be used on the decks of ships, for the purpose of separating chaff, straw, sand, or other foreign substances from corn or other grain, when it is being deposited in their holds for shipment.
445. H. Hatchwell, Newton Abbott, Devonshire, and S. B. Hatchwell, London—An imp. in stools or seats.
446. E. T. Truman, Old Burlington-street—Imp in masticators or machines employed in the mastication of gutta percha, india-rubber, and other similar articles.
447. M. L. J. Lavater, Guildford street, York-road, Lambeth—Imp. in the manufacture of pouches of india-rubber and india-rubber fabrics.
448. A. Horwood, 29, Great Quebec street, New-road—Imp. in the application of electricity for communicating by signals with carriages in motion on railways.
452. R. Cuthbert and W. Cuthbert, Newton-le Willows, Yorkshire—Improvements in reaping machines and grass-mowing machines.
453. A. Barclay, Kilmarnock—Imp. in pumping engines.
454. J. E. Cook, Greenock—Imp. in coating and protecting the silvered surfaces of looking-glasses or mirrors.
455. R. Mushet, Coleford, Gloucestershire—An imp. or imps. in the manufacture of cast-steel.
456. J. Martin, 10, Church-row, Limehouse—Imp. in the preparation of red dyes.
457. C. Stevens, 31, Charing-cross—An improved method of unhooking in Jacquard machines. (A com.)
458. C. Stevens, 31, Charing-cross—An improved elastic horse collar. (A com.)
459. A. L. A. Herbelot, Paris—Machinery for reducing wood into chips or shavings.
460. H. Mackenzie, Ardross and Dundonnell, Ross, N.B.—Improved means of applying the water of rivers for driving mills without weirs or other obstruction to the passage of salmon and other fish.
461. J. W. Wyatt, Bunhill-row, Finsbury—Imp. in coating or covering metallic springs or bands for crinolines and other articles of dress.
462. M. Meyers, Great Alie-street—Imp. in woven fabrics.
463. G. Ward and J. Gaskell—Imp. in machinery or apparatus for making healds.
465. F. E. Massey, 39, Rue de l'Echiquier, Paris—Imp. in the construction of self-inking stamps for postal and other purposes.
466. W. O'Shaughnessy Brooke, Parliament-street—Imp. in apparatus for suspending electric telegraph wires.
467. J. M. Dunlop, Manchester—Imp. in machinery suitabln for cutting india-rubber fillets.
468. J. Warren, Maldon—Imp. in chaff cutting machines.
469. L. Pohl, Offenbach, Germany—Imp. in albums or books for holding photographs, engravings, and other representations, and in binding together sheets or pieces of pasteboard or such like stiff materials, especially for the purpose of forming such albums or books. (A com.)
472. J. Hinks, Birmingham—An imp. or imps. in glass chimneys for lamps with flat wicks.
473. R. Mushet, Coleford, Gloucestershire—An imp. or imps. in the manufacture of cast steel.

Dated 25th February, 1861.

476. W. G. Smith, Elizabeth Port, Union County, U.S.—An imp. in the cutting apparatus of harvesters.
477. W. F. Henson, 15, New Cavendish-street, Portland-place—Imp. in springs.
478. J. Leeming, Bradford—Imp. in jacquard engines.
481. G. Clark, 11, Nicholl-square—Imp. in the manufacture and mode of laying down submarine electro-telegraphic cables.
482. G. Clark, 11, Nicholl-square—An improved mode of connecting and fastening together blocks, plates, or slabs of wood, metal, or any other material.
483. L. A. Bigelow, High Holborn—Improved machinery for making boots and shoes. (A com.)
485. J. Barling, Belle Grange, Lancashire—Imp. in the mode of applying engine power to wheels and other like instruments employed in producing locomotion, whether by land or water.
486. J. Young, Limefield, Edinburgh—Imp. in apparatus for the treatment or distillation of bituminous substances.
488. C. C. Regnault, Margaret-street, Cavendish-square—Imp. in the manufacture of oils, and in treating oils and fats for purposes of purifying, decolorizing, clarifying, and disinfecting them.

Dated 26th February, 1861.

489. E. Hettrick, North Hylton, near Sunderland—Imp. in the construction of furnaces for the prevention or consumption of smoke.
490. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in mechanical beds for invalids, applicable also to tables for anatomical or surgical operations. (A com.)
491. R. Tiernan, Liverpool—An improved apparatus for drawing liquid substances from vessels containing the same.
492. W. H. James, Old Kent road, Surrey—Imp. in the means or apparatus for taking or catching of fish, parts of which imps. are applicable to propelling and to arresting the progress of ships and boats, and to the forming of communication therefrom to the shore.
493. R. A. Brooman, 166, Fleet-street—Improved materials for, and imps. in, the manufacture of sugar moulds. (A com.)
494. W. Parish, New North-road, Hoxton—Imp. in the construction of tobacco pipes.
495. J. T. Pagan and T. B. Willans, Rochdale—An imp. in the manufacture of flannel.
497. M. Orenstein, Jewry-street, Aldgate—Improved means or apparatus for securing watches, and preventing the surreptitious abstraction of such articles from the pockets or other parts of the dress of the wearer.
498. L. Sideman and S. Phillips, Manchester—Imp. in hats, or coverings for the head.
499. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in forges. (A com.)

Dated 27th February, 1861.

501. W. Hudson and C. Catlow, Burnley, Lancashire—Certain imp. in power looms for weaving.
503. C. Stevens, 31, Charing-cross—Imp in chimneys. (A com.)
505. F. Ransome, Ipswich—Imp. in the manufacture of artificial stone and cement.
507. J. T. Whitgrove, Worcester—Imp. in funeral or mourning carriages.
509. W. Weallens, Newcastle-upon-Tyne—Imp. in steam engines and boilers, and in propelling and steering vessels.

PATENTS SEALED.

[*From Gazette, March 8th*, 1861.]

March 8th.
2189. J. Greenwood.
2193. R. C. Clapham.
2194. J. Dénéchaud and J. Chapa.
2196. T. Boyle.
2202. F. A. N. Freppel.
2203. R. H. C. Wilson.
2204. J. Petrie, jun.
2205. R. H. Gratrix and M. P. Javal.
2310. T. Fallows and R. Wild.
2362. A. F. Sheppard.
2481. J. Coleman, jun.
2486. W. E. Newton.
2543. A. V. Newton.
2605. H. Cook.
2654. W. E. Newton.
2813. C. W. Williams.
2868. J. F. Carosin.
56. E. C. Shepard.
62. S. Moulton.

[*From Gazette, March 12th*, 1861.]

March 12th.
2210. A. Ransford.
2214. F. M. Murton and J. Millington.
2220. C. T. Launay and A. M. A. D. de Vernez.
2221. J. Cooke.
2223. A. Burdess.
2225. J. Petrie.
2228. P. Paurard.
2231. W. E. Gedge.
2239. G. J. Wainwright and C. T. Bradbury.
2240. M. Burke.
2241. G. Davies.
2243. J. Horsey.
2244. F. Seiler.
2247. J. M. Napier.
2248. T. Barnett.
2249. S. Barnwell & A. Rollason.
2255. J. H. Walsh.
2258. W. H. Teulon.
2280. M. Sautter.
2290. V. H. Laurent.
2303. R. Smith.
2306. H. E. Skinner and W. H. Miller.
2359. W. Green.
2558. J. Burch.
2907. J. S. Manton and T. Islip.
2968. T. Whitehead.
2995. J. Musgrave.
3133. E. Whitehall.
3180. I. Dimock.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, March 8th*, 1861.]

March 6th.
466. B. B. Stoney.
492. G. T. Bousfield.
508. J. T. Coupier.
514. J. Jameson.

[*From Gazette, March 12th*, 1861.]

March 7th.
467. T. Lyne.
468. J. H. Johnson.

March 8th.
529. A. Wallis and C. Haslam.

March 9th.
489. J. Young.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, March 8th*, 1861.]

March 4th.
684. F. Seller.

March 6th.
585. G. Appolt and C. Appolt.

[*From Gazette, March 12th*, 1861.]

March 7th.
547. T. Dunn.
550. G. Beardsley.
567. W. Young.

March 8th.
562. J. Smith.

March 9th.
598. L. Whitaker, J. Diggle, and G. Howarth.

Journal of the Society of Arts.

FRIDAY, MARCH 22, 1861.

INTERNATIONAL EXHIBITION OF 1862.—GUARANTEE DEED.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others who take an interest in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £327,150, have already been attached to the Deed.

GUARANTEE FUND FOR THE EXHIBITION OF 1862.

The following additions have been made since the last announcement in the *Journal* for March 15:—

*** *The names marked with an asterisk are those of Members of the Society of Arts.*

NAME.	AMOUNT.	REPRESENTING THE OBJECTS OF THE SOCIETY—ARTS, MANUFACTURES, AND COMMERCE.
Lewis D. B. Gordon, 14, Abingdon-street	£1,000	Arts.
Morton Edwards, 5, George-street, Hanover-square	100	Arts.
Jas. Valentin, Shen Lodge, Walthamstow	200	Arts.
Wm. Paul Metchim, 20, Parliament-street, S.W.	100	Arts.
*Prior Purvis, M.D., Blackheath	100	Arts.
Stuart Knill, The Crossletts in the Grove, Blackheath	250	Arts.
Geo. Hibbert, 21, Queen-street, Mayfair, W.	500	Commerce.
Harry Privett, 47, Brewer-street, Golden-square, W.	100	Commerce.
G. W. M. Henderson, 103, Eaton-place, S.W.	500	Arts.
George Bin, 38, Edgware-road, W.	500	Commeree.
Levin Levi (Lee, Bros.), 27, Wood-street, E.C.	100	Commerce.
Geo. Humby, 2, Aberdeen-place, N.W.	100	Arts.
Jos. T. Younghusband, 53, Clefton-road, St. John's-wood, N.W.	500	Arts.
Charles Hill, 29, Threadneedle-street, E.C.	300	Commerce.
Richard Gunter, Lowndes-street, Lowndes-square, S.W.	300	Commerce.
Middleton and Answorth, Norwich	100	Manufactures.
James Holroyd (Holroyd, Bros., and Co.), 66, Basinghall-street, E.C. ...	300	Commerce.
Henry Johnson (Mayor of Stamford)	100	Arts.
J. Richardson (Henri Patent Cattle Feed Co.), London-bridge, E.C. ...	100	Commerce.
Hinstin, Bros., 22, Milk-street, Cheapside, E.C.	150	Commerce.
Bonamy Dobree (Governor of the Bank of England), 1, Broad-sanctuary, Westminster, S.W.	500	Commerce.
Capt. Edward Walter, Army and Navy Club, S.W.	500	Arts.
John Morgan, Amen-corner, E.C.	100	Commerce.
Fredk. George Underhay, Arundel-square, Barnsbury, N.	100	Arts.
Henry White, 5, Queen-street, E.C.	100	Commerce.
Major-General Edward Macarthur, 134, Piccadilly, W.	1,000	Arts.
Geo. Robt. Smith, 73, Eaton-square, S.W.	500	Arts.
Robt. Goulding Ledger, St. John's, Southwark, S.	100	Commerce.
Metzler, Geo. (Metzler and Co.), 37, Great Marlborough-street, W.... ...	300	Manufactures.
Silas Edward Martyn, 46, Thurlow-square, S.W.	200	Arts.
David Morgan Jones, (John Morgan and Co.) Amen-corner	100	Commerce.
Charles Farron, (Farron and Jackson,) 18, Great George-street, E.C. ...	100	Commerce.
Victor Barrer, 1, Ironmonger-lane, E.C.	100	Commerce.
Charles Clark, Mayor of Wolverhampton	100	Commerce.
Stephen Cave, M.P., 35, Wilton-place, S.W.	500	Arts.
Wm. H. Gore Langton, M.P., Clifton-court, Clifton, Bristol	500	Arts.
Edward Jones, Handsworth, near Birmingham	100	Commerce.
Samson Lloyd Forster, the Five Ways, Walsall	100	Commerce.
Henry William Hayes, (Hayes and Co.,) 4, Great Marlboro'.-street, W. ...	1,000	Commerce.
Henry Julius Leppoc, Manchester	100	Commerce.
Henry Samson, Manchester	100	Commerce.
William Armitage (Armitage and Rigbys), Manchester	500	Commerce.
*Marquis of Lansdowne, Lansdowne House, Berkely-square	1,000	Arts.
Richard Fisher, Medhurst	500	Arts.
*F. Burnett Houghton, 6, Clarendon-terrace, Kensington, W.	100	Arts.
*John Jeanes (Johnstone and Jeanes)	500	Manufactures.

NAME.	AMOUNT.	REPRESENTING THE OBJECTS OF THE SOCIETY—ARTS, MANUFACTURES, AND COMMERCE.
Edmund Johnson, 10, Castle-street, Holborn, W.C.	£100	Arts.
*Foster, Porter, and Co., 47, Wood-street, E.C.	1,000	Commerce.
John Hutchinson (Hutchinson and Earle), Widney, Lancashire	1,000	Commerce.
Derham, Brothers, Bristol	100	Commerce.
Robert Obbard, Blackheath	100	Commerce.
Wm. Golden Lumley, 10, Sussex-place, Regent's-park, N.W.	100	Arts.
Simon Abraham Kisch, 8, Lancaster-place, W.C.	100	Arts.
John Wallis, Wood-green, Tottenham	100	Arts.
William Callaghan, 23a, New Bond-street, W.	200	Commerce.
William Froggort, Manchester	100	Commerce.
William Phillip Phillips, (of W. P. and G. Phillips',) 155, New Bond-st., W....	500	Commerce.
George Phillips, (of W. P. and G. Phillips',) 359, Oxford-street, W. ...	500	Commerce.
James Chisholme Gooden, 33, Tavistock-square, W.	200	Arts.
John Browning, (Spencer, Browning and Co.,) Minories	250	Commerce.
John Cock, jun., Southmolton	100	Arts.
James Dundas, Dundas Castle, N.B.	100	Arts.
Michael Lewis Brown, 47, St. Martin's-lane, W.C.	100	Commerce.
Andrew Shanks, Robert-street, Adelphi, W.C.	250	Commerce.
Gilbert Greenall, Walton-hall) Warrington	500	Arts.
Sir Charles Rich, Bart., 12, Nottingham-place, N.W.	200	Arts.
J. and H. Brown and Co., Selkirk, N.B.	100	Commerce.
*C. W. Siemens, 3, Great George-street, Westminster	100	Arts.
William Willans, President of the Chamber of Commerce, Huddersfield ...	500	Commerce.
Thomas Mallinson. Huddersfield	500	Commerce.
Thomas Brooke, (John Brooke and Sons,) Huddersfield	1,000	Commerce.
Joseph Hirst, Huddersfield	500	Commerce.
*Charles Brook, Huddersfield	200	Commerce.
Joseph Wrigley, jun., (J. and T. C. Wrigley and Co.) Huddersfield ...	250	Commerce.
William Edwards Hirst, Huddersfield	250	Commerce.
Joseph William Walker, 27, Francis-street, Tottenham-court-road, W.C. ...	250	Commerce.
Hobbs, Ashley, and Co., 76, Cheapside	1,000	Commerce.
John Bazley White and Bros., Millbank-street, Westminster, S.W.... ...	500	Commerce.
Arnold Baruchson, 35, Dale-street, Liverpool	200	Commerce.
George Hawkins, 88, Bishopsgate-street Without, E.C.	200	Commerce.
Charles Gregory, 212, Regent-street, W.	500	Commerce.
C. Hindley and Sons, 134, Oxford-street, W.	1,000	Commerce.
Samuel Tillett, 6, Wellington-terrace, Bayswater, W.	100	Commerce.
George Dixon, Birmingham	100	Manufactures.
William Powell (John Hardman and Co.), Birmingham	500	Manufactures.
John Smith (Beckett and Co.), Bankers, Leeds	1,000	Commerce.
Wm. Bailey Holdsworth (W. B. Holdsworth and Co.), Hunslet, Leeds ...	100	Manufactures.
Andrew Fairbairn, Woodsley House, Leeds	500	Arts.
*John Corbett, The Stoke Works, near Bromsgrove	100	Manufactures.
Rev. Samuel Fisher, Hope Parsonage, Hanley	200	Arts.
William Ecroyd and Sons, Lomeshaye Mills, Burnley	300	Manufactures.
Joseph Lézard (Baume and Lézard), 21, Hatton-garden, W.C.	200	Commerce.
Thomas Glover, 8, Upper Chadwell-street, Pentonville, E.C.	1,000	Manufactures.
George Newen, 1, Hyde-park-terrace, W.	1,000	Arts.
James Edmeston, (Hon. Secretary of Architectural Exhibition,) 5, Crown-court, Old Broad-street, E.C.	100	Arts.
George Roberts, Provost of Selkirk	100	Arts.

By Order,

P. LE NEVE FOSTER, *Secretary.*

INTERNATIONAL EXHIBITION OF 1862.

The Committee appointed to advise Her Majesty's Commissioners for the Exhibition of 1862, as to the period of Art to be represented at the forthcoming Exhibition, have held two meetings at the rooms of the Society of Arts. There were present—The Marquis of Lansdowne, K.G.; Earl Spencer; Earl Stanhope; Earl Somers; Lord Overstone; Lord Taunton; Lord Elcho, M.P.; Sir Stafford Northcote, Bart.; Sir Francis E. Scott, Bart.; Mr. Thos. Ashton; the Rev. E. Coleridge; Mr. Edwin Field; Mr. H. T. Hope; Mr. John Ruskin; Mr. W. Stirling, M.P.; Mr. S. J. Stern; Mr. Tom Taylor; Mr. W. Wells; Sir Charles Eastlake, President of the Royal Academy; Mr. Fred. Tayler, President of the Old Society of Painters in Water Colours; Mr. J. Y. Hurlstone, President of the Society of British Artists; Mr. Henry Warren, President of the New Society of Painters in Water Colours; and Professor C. R. Cockerell, R.A., President of the Institute of British Architects; attended by Mr. Le Neve Foster, Secretary to the Committee.

The following resolutions were passed:—

1. That the Exhibition ought not to be confined to the works of living artists.

2. That the object of the proposed Exhibition being to illustrate the progress and present condition of Modern Art, it be left to each country to decide under what

arrangements, and within what limits, that object can, in its own case, be attained, regard being had to the amount of space that can be devoted to its productions.

3. That as regards British Art, the above object will be fully attained by confining the Exhibition to the works of artists living at any period within the century preceding the Exhibition, *i.e.*, subsequent to the year 1762.

The Committee for advising her Majesty's Commissioners for the Exhibition of 1862, in reference to the formation of Trade and Local Committees, held their first meeting at the rooms of the Society of Arts yesterday. There were present:—The Marquis of Hartington, M.P.; the Lord Stanley, M.P.; the Lord Stanley of Alderley; the Right Hon. T. Milner Gibson, M.P., President of the Board of Trade; the Right Hon. Wm. Hutt, Vice-President of the Board of Trade; Mr. Thomas Field Gibson, one of the Commissioners of the Exhibition of 1851; Mr. H. Cole, C.B., Her Majesty's Commissioner for the Paris Exhibition of 1855; Sir Thomas Phillips, Chairman of the Council of the Society of Arts; Mr. G. Ridley, Chairman of the Newcastle-on-Tyne, Shields, and Gateshead Chamber of Commerce; Mr. D. Hollins, Chairman of the Potteries Chamber of Commerce; Mr. Robert Thompson, President of the Chamber of Commerce, Stockton-on-Tees; Mr. Thomas Evans, Chairman of the Bristol Chamber of Commerce; Mr. Edmund Potter, President of the Manchester Chamber of Commerce; Mr. John Whitwell, Chairman of the Chamber of Commerce, Kendal; Mr. William H. Payne, Vice President of the Dover Chamber of Commerce; Mr. J.R. Stebbing, President of the Southampton Chamber of Commerce; Mr. Henry W. Ripley, President of the Bradford Chamber of Commerce; Mr. C. M. Norwood, President of the Hull Chamber of Commerce; Mr. John J. Kayll, President of the Sunderland Chamber of Commerce; Mr. J. Jobson Smith, President of the Sheffield Chamber of Commerce; attended by Mr. E. A. Bowring, Secretary to the Committee.

THIRTEENTH ANNUAL EXHIBITION OF INVENTIONS.

The Exhibition will be opened on Monday, the 1st April, and will remain open every day until further notice, from 10 a.m. to 4 p.m., members and their friends being admitted free.

Members by ticket, or by written order, having their signature, may admit any number of persons. Members of Institutions in Union with the Society are admitted on showing their cards of membership.

FIFTEENTH ORDINARY MEETING.

WEDNESDAY, MARCH 20, 1861.

The Fifteenth Ordinary Meeting of the One Hundred and Seventh Session was held on Wednesday, the 20th inst., A. W. Williamson, Esq., Professor of Chemistry, University College, London, in the chair.

The following gentlemen were proposed for election as members of the Society:—

Blagden, George	5, Duerdin-villas, Tollington-park, N.
Broadwater, Robert ...	3, Billiter-square, City, E.C.
Callow, Thomas.........	8, Park-lane, W.
Coxon, Thos. Cooper...	3 Wharf, City Basin, E.C., and 351, City-road, E.C.
Dodsworth, Thomas ...	Clifton, York.
Gilbertson, W.	Laleston House, Bridgend.
Greaves, Richard	The Cliff, Warwick.
Hertz, —..................	Manchester.
Jackson, Thomas	Railway Station, Milford Haven.
Jones, Daniel Morgan..	1, Amen-corner, Paternoster-row, E.C.
Kennaway, William ...	The Shrubbery, Exeter.
Kisch, Simon Abraham	8, Lancaster-place, E.C.
Lake, James	Newlands, Sittingbourne.
Langton, W. H. Gore, M.P.	Clifton-court, Clifton, Bristol.
Lawn, William S.	Lancashire and Yorkshire Railway, Manchester.
Le Capelain, J.	Wood-lane, Highgate, N.
Miles, Pliny	169, King's-road, Chelsea, S.W.
Ralph, Jno. Rhodes ...	Savile Lodge, Halifax.
Reiss, James	Manchester.
Rendle, Wm. Edgecumbe	Mount View, near Plymouth.
Tootal, Edward.........	The Weaste, Eccles, near Manchester.
Uzielli, Theodosius ...	Hanover Lodge, Regent's-park, N.W.
Villiers, Rt. Hon. C. Pelham, M.P..........	39, Sloane-street, S.W.
Wright, Francis Beresford	Osmaston Manor, Derby, and 21, Dover-street, W.
Wright, F., Junr.	" " "

The following candidates were balloted for and duly elected members of the Society:—

Adam, James S.	8, Philpot-lane, E.C.
Allhusen, Christian ...	Newcastle-on-Tyne.
Arthur, James Kennedy	18, Somerset-street, Portman-square, W.
Brooke, William	Brook-street, Manchester.
Burke, John S.	4, Queen-square, Westminster, S.W.
Chambers, George	11, George-yard, Lombard-street, E.C.
Dumergue, Captain Edward	Cleveland-walk, Bath.
Etches, Wm. Jeffery...	The Park, Litchurch, and Derby.
Forster, H. Rumsey ...	Messrs. Samuel Allsopp & Sons, 61, King William-st., E.C.
Gibbs, Henry Hucks	St. Dunstan's, Regent's-park, N.W.
Guedalla, H.	Gresham Club, City, E.C.
Hutchins, E. J.	6, Kensington Palace-gardens, W.
Ibbotson, Thomas H.	12, New Brown-st., Manchester.
Letts, Thomas, jun. ...	Sydenham, S.E.
Oakley, Henry	Great Northern Railway, King's-cross, N.
Rose, William Anderson, Alderman	Queenhithe, E.C.
Stevenson, John.........	Canal Foundry, Preston.

The Paper read was—

THE ECONOMIC HISTORY OF PARAFFINE.

BY CHARLES TOMLINSON, LECTURER ON SCIENCE, KING'S COLLEGE SCHOOL, LONDON.

It must often I think have occurred to the members of this Society, accustomed as they are to the contemplation of natural as well as artificial products, how wide a difference exists between the two; how apparently exhaustless the one, how limited the other; how rich in suggestion, how profitable for study the one; how comparatively barren, how easily comprehended the other. Take, for example, almost any natural object, point out its properties, say all that is known respecting it, and it will probably not be too much to assert that quite as much remains to be discovered as is already known. Take almost any product of the industrial arts, any machine or contrivance formed by art or man's device, and you will

be able soon to exhaust its properties, soon to tell everything relating to it—it was made for certain purposes—it fulfils those purposes more or less completely; and when most admirable, it is probably because it has conformed to scientific teaching, and has taken inspiration from some natural law.

There is scarcely a better known natural product than common coal, and yet how marvellous are the properties of that familiar substance. Its history, if fairly written, would be of the bulkiest; it would take us into many sciences, it would draw upon many arts, and when written—when all that is known respecting it had been set down—the last words of the last page must still be, "To be continued."

Such must ever be the case when the finite attempts to take measure of the Infinite—when the human seeks to scan the purposes of the Divine mind in the varied relations of an individual specimen of any one of the great kingdoms of nature.

I trust the Society will not deem these reflections impertinent to my subject, which, though including only one of the applications of coal, is indeed so large, that in attempting to give anything like a complete and logical account of it, I am bewildered with its richness, and the multiplicity of details, all so important, and so suggestive, that my task of selection would be one of great difficulty, were I not guided by a principle which this Society I know will appreciate, namely, that of insisting on its technological, rather than on its scientific bearings. The botanist, the chemist, the geologist, the palæontologist, have abundant information to give us respecting the various kinds of coal, bitumen, petroleum, &c. My business is to gather together a few details chiefly respecting one substance that has been associated with coal and other carbonaceous bodies, and to point out some of its applications to the arts of life.

Paraffine, however, is so mixed up with other compounds of carbon and hydrogen that it will not be easy to disentangle it without some reference to them. I must, however, be permitted once more to remind the Society that my object is industrial, not chemical. Some of the most illustrious chemists of this and of other countries have been, and are devoting their high powers to the solution of questions of great importance and still unsettled, respecting the products of the different varieties of coals and bitumens, so that it would be presumptuous in me, a simple technologist, to pretend to do more than invite the attention of the Society to a few practical applications of the labours of those distinguished men.

In common with all other branches of industry the distillation of coal has been of slow growth. Sources of inflammable gas had long been known to exist in the coal districts of this country before the year 1659, when Mr. Shirley communicated to the Royal Society of London a notice of some experiments on an inflammable gas issuing from a well near Wigan, in Lancashire. Some years later Dr. Clayton made some direct experiments on the distillates of coal, but they were not communicated to the Royal Society, or indeed made public, until the year 1739. He says:—"First there came over a flegm, then a black oil, and then likewise a spirit arose, which I could in no wise condense." This spirit (as the inflammable non-condensible gas was called) excited so much curiosity that the black oil was disregarded. Yet Dr. Hales, in 1726, had published a notice of some experiments on the distillation of coal, and had mentioned the condensation of a volatile oil in the vessel attached to his still. Dr. Watson also noticed the production of oils, when coal is heated to redness in close vessels.

This scanty information expressed all that was known for many years on the subject of the liquid products of the distillation of coal.

In 1781 Lord Dundonald obtained a patent for "a method of extracting or making tar, pitch, essential oils, volatile alkali, mineral acids, salts, and cinders from pit-coal"—"which coals, being kindled, are enabled by their own heat, and without the assistance of any other fire, to throw off in distillation or vapour, the tar, oil, &c., they contain into receivers or condensing vessels,"—"the art depending on the management of the air admitted into the kilns, which can only be acquired by experience."

In 1797, a writer in the *Encyclopædia Britannica* refers to Lord Dundonald's process with applause. "He turns to a very considerable profit the mines of coals in his and other estates, building ovens of a proper construction for burning pit coal into coke, and at the same time collecting in separate receptacles the volatile alkali, oil, tar, and pitch, which are generally lost by the usual method." The writer goes on to say, that this method, compared with the usual method of coking coal, "affords a very remarkable instance of the great losses to mankind, for want of carefully attending to every result from great processes of art when made on a large scale. These ovens are so contrived as to admit an under supply of air, and the coals, after being kindled, decompose themselves by a slow but incomplete combustion, which does not destroy the ingredients. The residuum left in the oven proves to be most excellent cinders or coaks."

It appears that about this time M. Faujas de St. Fond introduced into France a similar process, from information which he had obtained at Lord Dundonald's works, forgetting, however, as Frenchmen sometimes do, to acknowledge the source of his information.

The article above referred to states that, "on subjecting pit-coal of any kind to distillation in close vessels, it first yields phlegm or watery liquor, then an ethereal or volatile oil, afterwards a volatile alkali, and lastly a thick and greasy oil; but it is remarkable, that by rectifying this last oil, a transparent, thin, and light oil of a straw-colour is produced, which being exposed to the air, becomes black like animal oils."

Mr. Northern, of Leeds, in the *Monthly Magazine* for April, 1805, directed attention to the use of coal gas. He says, "I distilled in a retort 50 oz. of picked coal in a red heat, which gave 6 oz. of a liquid matter covered with oil, more or less fluid, as the heat was increased or diminished; about 26 oz. of cinder remained in the retort; the rest came over in the form of air. * * In the receiver I found a fluid of an acid taste, with a great quantity of oil, and at the bottom a substance resembling tar." In this, and in Lord Dundonald's previous process, we have the germ or basis of the manufacture of volatile oils from coal. The germ, however, was destined to remain nearly half a century without expanding, and what at last gave it vitality was the demand for rapid solvents of caoutchouc, which led to the distillation of tar, as a source of benzole, when other valuable luminiferous agents were found to be present, or separable from the tar.

The subject, however, had not altogether remained neglected. Substances were obtained from different sources, and by different inquirers, in various parts of the world, and at length becoming assembled and made known to each other, certain relationships were recognised where least expected. In 1812, Mr. Le Witte patented an apparatus for extracting tar from coal, for the manufacture of varnishes, and for protecting surfaces. It is stated that 10 per cent. of tar was thus obtained, while the residual coke was a valuable marketable product. In 1819, Theodore de Saussure obtained from the asphaltic limestone, near Neufchatel, in Switzerland, an oil which he found to be identical with that from the petroleum of Amiano. In 1824, Chervau took out a patent for a method of distilling bitumen from the rocks in the Department of Sâone et Loire. The manufacturers stated that they extracted 40 parts of volatile oils from 100 parts of rock, and they recommended their bitumen or naphtha as a fuel for alcohol lamps. The year 1829 introduces us to Reichenbach, the proprietor of chemical works in Moravia, whose name occupies a high place in connection with our subject. In that year, while examining the tar obtained from the dry distillation of beech-wood, he discovered *paraffine*, a wax-like substance, which earned its name from its want of

affinity for other bodies (*parum affinis*, or "little affinity") for it would neither unite with acids nor alkalies; it was insoluble in water and alcohol, and had no action on metals. An oil, which possesses some of these properties, has received the name of paraffine oil, and has been extensively used as a lubricator. Reichenbach, also, in pursuing this inquiry recognised paraffine in the tarry matters distilled from other species of wood, and also in the tars arising from the distillations of the bitumens, and, at a later period, in the tar obtained from coal. He also obtained from the tar of wood naphthalin and kreosote, and also bodies named piccamar and pittacal, which have been but imperfectly examined. In 1833 and 1834, he distilled coal in close vessels in contact with water, but from 220 lbs. of coal he obtained only 9 ounces of volatile oil. In 1833, Dr. Bley obtained a small quantity of volatile oil, and some ammoniacal products, by distilling brown coal. These failures, as they must be called, so far as respects coal, arose from misapprehension respecting the required temperature, the manipulation of the gas house naturally suggesting a high degree of heat, and inquirers did not recur to the earlier methods of trying the effects of a comparatively low one. As early, however, as 1841, improved forms of apparatus for distilling coal were introduced by the Count de Hompesch and others, and the problem how to obtain liquid products instead of permanent gases began to assume a clearer form.

Hompesch's patent is "for improvements in obtaining oils and other products from bituminous matters, and in purifying and rectifying oils obtained from such matters." These are "bituminous schists, shales, or slates, or other rocks or minerals containing bitumen or bituminous substances." He describes the oil of schist or clay slate as "essential oil, intermediary fat oil, and thick oil." His method of distillation is in a long iron close retort, arched on the top, and flat at the bottom, and part of his apparatus is an Archimedean screw, for filling the retort and turning out the coke at the other end.

There were three tubes leading from the retort, one at the part farthest from the furnace, another in the middle, and another at the end nearest the furnace, and Hompesch says that he obtains the three separate oils by the gradual increase of the heat, thus effecting distillation without decomposition of the substance. His mode of rectifying the fat oil is by distilling it with sulphuric acid and treating it with caustic potash lees.

In 1845, M. Du Buisson patented a process for "new and improved methods for the distillation of bituminous schistus, and other bituminous substances, as well as for the purification, rectification, and preparation necessary for the employment of the productions obtained by such distillation for various useful purposes." His works were at Autun, in France, and one feature in his process is the employment of steam. He applies a low red-heat, and "when the oil begins to be disengaged, steam is introduced through the cock into the cast-iron pipes which are now heated to redness." His object in introducing the steam is to abridge the process of distillation. "The effect," he says, "of introducing steam at a high temperature, is to shorten the time necessary for distillation, six hours for every sixteen, which is a very great advantage, and nearly double the quantity of oil is produced in a given time." By the introduction of steam also, "the retort does not require to be heated to so high a temperature, which prevents decomposition of the oils, and saves wear and tear of the apparatus." The practical effect of the steam was thus to carry off the vapours of the schist as fast as they were formed, and to prevent the retort from being raised above a red-heat by the external application of the fire. The products of the distillation were a liquid bitumen, named raw oil of schistus, ammoniacal water, and a carbonaceous residuum. From this raw oil of schistus are obtained two volatile oils, the first of which may be used in lamps with the greatest advantage with a reservoir below, and with a double current of air in which the oil rises a distance of about five inches by the capillary attraction of the wick. The light is described as being "superior to that of gas, without any unpleasant smell or smoke; the said lamps have a glass or chimney, with a diaphragm of the same diameter as the wick, and placed a little above the top of the burner." Another oil is also described, capable of being "burnt in the said lamps without any alteration, by mixing with it a corresponding oil obtained from petroleum and other bituminous mineral substances." In the third place he gets a fatty mineral oil, which he says "contains paraffine in large quantity. It is particularly applicable for lubricating, for machinery;" and fourthly, he obtains paraffine "by crystallisation from fat and thick oils; it is thus obtained very pure, and requires but little treatment to make excellent candles." He also gets a black and siccative tar. His method of purifying the raw oil is by distillation with sulphuric acid, drawing off the supernatant oil, neutralising the sulphuric acid by means of a caustic solution of soda, and by alcohol, the latter carrying off a pure red colouring matter. He also distils again, and collects the different oils of different densities into separate receivers. He has also a method of depriving the first refined product of its bad odour by means of sulphuric acid, caustic soda, hydrate of protoxide of iron, sulphate of iron, and caustic solution of soda, and he cautions against putting water upon the oil before the caustic solution of soda, since the effect would be to clog the wick and to make the paraffine oil give out a bad smell while burning. With respect to the paraffine, he states that "it may be separated from the oil merely by pressure in the same manner that stearine is separated from oleine." The paraffine is then melted and filtered on a small quantity of animal black in a double funnel, heated by steam or boiling water, after which it is fit for making candles.

In France, M. Selligue had obtained tars by distilling the bituminous schists of Autun, and the paper coal and bituminous slate of the coal formation. He also purified the oils, and produced burning fluids, which had a considerable sale in France. In 1847, Mansfield obtained a patent for the separation and purification of volatile liquids from tar, and his benzole (which he was the first to obtain, nearly pure, on a large scale) met with a ready sale as a solvent of caoutchouc. Mr. Lowe had, a few years before, applied the lighter portions of coal naphtha to increase the luminosity of coal gases; and naphthalized gas was for a time a familiar term.

In 1849-50, works were erected at Weymouth, in Dorsetshire, for carrying out Du Buisson's process. Works were also carried on near Wareham, in the same county, by the Bituminous Shale Company, and they advertised the sale of oils from shale as "Oil No. 1, or volatile; oil No. 2, or rough oil, which contains paraffine, grease, and varnish; oil, No. 3, or machine oil, which contains paraffine, grease, and varnish, grease liquid, alkaline ditto manufactured, asphalte or varnish." It appears, also, that Mr. John Thomas Cooper, the Consulting Chemist, in 1847, prepared paraffine oil, lubricating oil from paraffine, and paraffine itself, from the distillation of coal. In 1849, the Bog-head Cannel became known, and was used as a source of paraffine and paraffine oils. Mr. James Young's patent bears date 1850, and its origin may be referred to about the year 1847, when Dr. Lyon Playfair called Mr. Young's attention to a petroleum spring in Derbyshire, which he thought might produce some oils useful to the manufacturer. On examining this spring, it was found to be in an old coal mine. The coal had been worked out, and from the roof, which consisted of sandstone, there exuded a thick, dirty-looking oil, known as petroleum or rock oil. Mr. Young obtained from it some useful lubricating oils, and as the supply was but limited, he invented a process for obtaining rock oil from coal, the varieties best suited to his purpose being parrot-coal, cannel-coal, gas-coal, and, lastly, bog-head mineral. Mr. Young is entitled to the merit of having invented a number of useful processes for the separation and purification of these oils, without apparently being aware of what had already been accom-

plished in the same branch of industry. Mr. Young, with his partner, Mr. Meldrum, erected works on the Boghead estate, 15 miles from the Forth, for the advantage of being within reach of the Boghead cannel, or, as it is now called, the Torbanehill mineral. Their process is as follows:—The retort is placed vertically, with a hopper on the top; the fire is applied by a kiln below; the retort is cased with fire brick for about three-fourths of its height, so that the heat passes through this to the retort. As the coals come down, they are distilled by the heat, and the products are passed through a worm pipe into a refrigerator, where they are condensed. The first product is described as a crude oil, containing paraffine. It is distinguished from tar in not drying by exposure to the air, and in being lighter than water. The rectification is by the application of sulphuric acid and soda, with two or three distillations. About two-thirds of the oil is run off as oil, part for burning and part for lubricating. The solid remainder contains paraffine, from which it may be extracted by the ordinary methods of purification.

In the great Exhibition of 1851, Mr. Young obtained credit, and justly, for the production of paraffine in considerable quantities. The former processes, although containing all that was necessary for its production, were not commercially successful. Either they do not produce the article in sufficient quantity, or at a sufficiently low cost to be profitable. Mr. Young has the great merit of first drawing public attention to the commercial value of paraffine, and of pointing out the sources from which it could be profitably extracted.

In Germany, paraffine works were started in 1855, at Beuel (near Bonn), Ludwigshafen, and Töplitz, and paraffine was soon applied to many uses, and met with a large demand. Manufactures were also established in France and Austria, and most extensively in several parts of the United States of America.

In the last-named country the first attempts were made on the bituminous shales of Dorchester, New Brunswick. Extensive works were erected at Brooklyn, near New York, Pittsburgh, Baltimore, and at several places along the Ohio valley and river. The oils produced are in great demand, exceeding till lately the supply, as solvents, lubricators, and for illumination. They give a whiter and more brilliant light than any fixed or fat oil, and are much cheaper. Hence they limit the demand, and keep down the price of fish, lard, and sperm oils; but complaints have been made that the oil is sent out in a crude and impure state, retaining much of the tar and creosote impurities.

The term photogen has been applied to the oils or naphthas obtained from shales, brown coals, cannels, and especially the bog-head variety, and used for illuminating purposes. It is also known as paraffine oil. It differs in specific gravity from ordinary coal oils of the same boiling point, varying from ·820 to ·830, while common coal naphtha has a density of ·850. When photogen has a higher density than that indicated, and a very high boiling point, it probably contains paraffine. The photogen may also be obtained from ordinary bituminous coals by distilling them at a temperature of about 700° C. Coal is broken small, heated in iron retorts, and the tar is received through a very wide worm into tanks. In some cases the coals are distilled by the heat of their own combustion, or by a modification of Lord Dundonald's plan. The tar thus obtained is distilled, and the lighter portions, after purification, form what is called bog-head naphtha, or as, in Germany and elsewhere, the distillate is divided into two portions, the more volatile being photogen, and the less volatile solar oil. Both oils are purified by concentrated sulphuric acid, which removes the highly coloured and odorous constituents of the distillate, and also by an alkali, which removes carbolic acid and its congeners, together with the remains of the sulphuric acid and some sulphurous acid. In this country, the heavy and light oils are mixed together, so as to produce a fluid of medium density and volatility. The more volatile hydro-carbons give great inflammability and fluidity, and they are also more odorous than the less volatile portion of the distillate, which is the true paraffine oil.

At the establishment near Bonn, the lignite of the neighbourhood, known as leaf or paper-coal, is distilled at a low red read heat in iron retorts. A blackish tar and ammoniacal liquid are the product; the former is said to yield 90 per cent. of oils, 50 per cent. of which are thin enough to burn in lamps. They are purified by means of sulphuric acid and alkaline leys.

Wagenmann's process is with bituminous coal, which is broken into small lumps, sprinkled with milk of lime, to get rid of sulphur, dried in a desiccating furnace, and distilled in retorts. The liquid products are received into a large reservoir, kept at a constant temperature of 30 deg. centigrade, where the tar separates from the ammoniacal liquor, and the latter being mixed with the residue of the large retorts, furnishes a good manure. The tar is pumped up into the purifying apparatus, mixed with sulphate of iron, and distilled in vessels of the capacity of 350 gallons, by means of superheated steam. The products are condensed in a leaden coil, and consist of volatile liquids of the specific gravity of ·700 to ·865, heavy oils for lubrication, ·865 to 900 and paraffine, ·900 to ·930. These three substances are treated each with 4, 6, and 8 per cent. of sulphuric acid, 1¼th and 2 per cent. of hydrochloric acid, and 1 per cent. of acid chromate of potash, with which they are agitated for half an hour. They are then left for three hours, poured off the dregs, and mixed with 2, 3, and 4 per cent. of a ley of caustic potash (50° B). Lastly, each of the products thus purified is placed in a still, and distilled by superheated steam. No. 1 mixed with No. 2, so as to obtain the specific gravity of ·820, produces the mineral oil or photogen, which is burnt in lamps fitted for the purpose. Part of the product distilled from No. 2 having a specific gravity ·860 to ·700, forms the solar oil, which may be burnt in Argand or Carcel lamps; the rest of No. 2, mixed with some of the product of No. 3, furnishes the lubricating oil for machines. The remainder of No. 3 is introduced into a vat, where the temperature is lowered till it crystallises. In the course of three or four weeks, the paraffine crystallises in large tablets, and is separated from the adhering oil by means of centrifugal machines, making 2,000 revolutions per minute. The paraffine is melted and rolled into squares, and subjected to a strong hydrostatic pressure. It is then again melted, and treated with 50 per cent. of strong sulphuric acid, at a temperature of 180 deg. C. In two hours the paraffine separates from the acid, and is washed with water; it is then run into cakes, and pressed in the hydrostatic press while hot between two layers of hair cloth. It is once more melted, mixed with 5 per cent. of stearine, and maintained for some hours at a temperature of 150 deg. C. in a leaden apparatus. It is lastly mixed with one per cent. of a solution of caustic potash (40 deg. B.), and at the end of two hours all the impurities will be separated, and the paraffine may be drawn off as limpid as water.

In a valuable article on photogen, by Mr. Greville Williams, in the last edition of "Ure's Dictionary," is a table showing the materials employed for distilling these oils with the per centage of tar of the oils and of paraffine. The raw material consists of Trinidad pitch, the bog-head cannel, or torbane mineral of Scotland, Dorset shale, Belmar turf from Ireland, George's bitumen from Neuwied, paper coal and brown coal from various parts of Germany, and Rangoon tar. But of all the substances hitherto employed none are so rich in results as the last.

This brings us to speak of some of nature's distillations. Various bitumeniferous productions are formed in vegetable matter during its conversion into coal. Among these are mineral oil, an inflammable fluid, sometimes forming powerful springs, and frequently occurring in carboniferous deposits. Likewise naphtha, a transparent and nearly colourless liquid, burning with a copious flame, and strong odour, and leaving no residuum. Springs of naphtha may

burst forth during mining operations, as in the coal-shale of Derbyshire, where, in driving a level, a large quantity of this liquid poured forth and covered the surface of the water in the level, and being accidentally set on fire, it formed a burning spring, which lasted several weeks. There is also petroleum, a dark coloured substance, thicker than common tar, which rises in immense quantities from some of our own coal beds, and from the carboniferous strata of some parts of Asia and elsewhere. Petroleum springs do not seem to depend on combustion, as has been supposed, but to be simply the effect of subterranean heat. And it is not necessary that the depth should be very great beneath the surface to give a temperature equal to the boiling point of water, or of mineral oil. In such a position the oil may be supposed to suffer a slow distillation, and so find its way to the surface, or it so impregnates the earth as to form springs and wells, as in Persia and India. Petroleum springs are those whose waters contain a mixture of petroleum and the various minerals allied to it, such as bitumen, naphtha, asphaltum, and pitch. They are very numerous, and in many cases undoubtedly connected with subterranean fires which raise or sublime the more subtle parts of the bituminous matters contained in rocks. Petroleum springs occur in abundance in Modena and Parma, in Italy, but the most powerful of which we have any account are those on the Irrawadi, in the Burman empire. In one locality there are said to be 520 wells, which yield 400,000 hogsheads of petroleum annually. The heat by which these chemical changes and transformations produce from vegetable matter such enormous quantities of petroleum, may also cause this substance to be forced up to the surface, in its native state, where by exposure to the air it becomes inspissated, and forms the different varieties of pure and earthy pitch or asphaltum, as in the case of the vast accumulations in the island of Trinidad. Bitumen is an inspissated mineral oil, of a dark brown colour, with a strong odour of tar. It sometimes occurs of the consistence of jelly, bearing some resemblance to soft India rubber, and as it will remove the traces of a pencil, it has been named "mineral caoutchouc." Native bitumen and the substance of that name obtained from certain varieties of coal, when heated, if not identical, are closely allied, or yield products which are so. The varying proportions of bitumen which different varieties of coal are capable of yielding depend on the amount of change which the vegetation has undergone since its deposition. In some cases the internal heat, accompanied by moisture and great pressure, has expelled all the volatile matter, and reduced the coal to the state of anthracite. The amount of volatile matter in coal and bituminous minerals may vary from 10 to 63 per cent., forming the different varieties of dry and fat coal. The bitumen of coal resembles the bitumen of nature known as asphalte and mineral tar in its sensible qualities and general appearance; but it does not contain the same proximate principles; nor does it by dry distillation yield the same fluids. "They belong, however, to the same natural group or series, and tend to strengthen the opinion generally held that bitumen, petroleum, and asphalte, arise from the decomposition of fossil vegetation. The natural bitumens always contain some volatile oil ready formed, and their varieties depend on the greater or less proportion of this volatile oil present in them."

It was long supposed that the paraffine of tar, and of certain mineral substances used for the production of heat and light, was not a natural product, but one entirely due to the artificial action of heat upon those substances; but as Professor Bolley has pointed out (Mem. Chem. Soc.), masses of naturally separated paraffine have been found in deposits of rock oil, at Borystow, in Galicia, while the minerals ozokerite, sheererite, idrialin, &c., show that hydro-carbons differing considerably in melting point, and chemical composition, occur ready formed in nature. Professor Bolley has also detected paraffine ready formed in bog-head shale, by exhausting it with various re-agents. A kilogramme of the pulverised shale yielded to alcohol 2·14 parts of solid extract residuum and to ether, after drying, 2·63 parts. The latter was unctuous to the touch, and not very deeply coloured; it could be redissolved in ether, and decolorised by agitation with animal charcoal. The residue then exhibited by elementary analysis, a quantity of oxygen amounting to 11 per cent., and gradually turned yellowish when heated for some time in a water-bath above its melting point. It sustained a loss by boiling with soda-lye, and the undissolved portion melted at 41° C. It remained colourless when heated, solidified in crystalline laminæ, was insoluble in water, sparingly soluble in alcohol, somewhat more soluble in ether. The analysis of this residue gave—

Carbon	86·33 per cent.
Hydrogen	13·32 ,,
	99·65

Professor Bolley thinks it probable that paraffine exists as such in several of the materials from which it has hitherto been prepared by destructive distillation, and he submits the above process of separation as a convenient method of testing such substances, with reference to their utility for the preparation of paraffine. Remarking on the common statement that the non-existence or rarity of paraffine in coal tar is due to the great heat employed in the distillation, he suggests that it is rather because true coal does not contain paraffine ready formed, and therefore cannot yield a tar containing paraffine. On examining two sorts of coal by this method, he obtained, not paraffine, but an extract of the nature of asphalte. It may be remarked, however, that Professor Bolley's method would have been more complete if he had subjected his specimens to the action of heat, when he would probably have obtained a further development of paraffine.

Petroleum, in many parts of the world, is now the most abundant source of photogen and paraffine. In the State of Pennsylvania, according to a statement in the *Times*, petroleum wells are sunk, and they yield from ten to fifty barrels of oil per day, and some even more. Last year, in Ohio, fifty miles from Cleveland, oil was discovered; fifty wells were at once sunk, and they yielded from ten to sixty barrels a day, and a few months later hundreds of wells were in operation. It is refined for illuminating purposes, and is said to be superior to the best sperm, at half the price, while in the crude state it is a good lubricant, and is in great demand by the railway companies.

But, perhaps, the most remarkable commercial fact is, that the Rangoon tar finds its way from the banks of the Irawadi to this country, and is the source of the beautiful paraffine candles which are burning on the table before you. This Rangoon tar, or Burmese naphtha, is used by the natives as a lamp fuel, and as a preservative of timber against insects. When drawn up, it is a semi-fluid naphtha. It occurs among sandstone and blue clay. It is as soft as goose-grease, of a greenish-brown colour, and of a peculiar but not disagreeable odour. The wells are sunk to the depth of sixty feet, and the fluid oozes into them. Rangoon tar is imported in close metallic tanks, to prevent loss by evaporation.

The specimens of Rangoon tar on the table, together with the various products separated from it, have been kindly furnished by the managing director of Price's Patent Candle Company, Mr. George F. Wilson, who is well known to this Society. The process adopted at the Sherwood Works is that of Dr. De la Rue,* and consists of a simple separation without chemical change, whereas the solids and liquids, bearing some resemblance to those from

* The Proceedings of the Royal Society of London, vol. viii. (1857), contain an abstract of a paper entitled "Chemical Examination of Burmese Naphtha, or Rangoon Tar," by Drs. De la Rue and Müller.

the Rangoon tar obtained from peat, coal, &c., have been formed by their decomposition.

In the first place the Rangoon tar is distilled with steam at 212 deg. Fahrenheit. The distillate contains a mixture of a number of volatile hydro-carbons, which it is difficult to separate on account of the diffusible nature of the vapours, however different their boiling points. In practice, a second or third distillation is adopted, and the products are arranged according to their boiling points or densities, which vary from ·627 to ·860, and although they all originally came over with steam at 212 deg. Fahr., their boiling points range from 80 deg. to upwards of 400 deg. Fahrenheit. All these liquids are colourless and solvents of caoutchouc. Those of low specific gravity are known as Sherwoodole and Belmontine. They have considerable detergent power, removing stains from silk without impairing delicate colours. The distillate of higher specific gravity burns with a brilliant white flame, and as it cannot be ignited without a wick, forms a useful lamp fuel. Sometimes these lamp fuels may not be sufficiently fluid at ordinary temperatures to ascend the wick. Messrs. Price and Co. have introduced a modification of the old cocoanut oil lamp for overcoming this difficulty. A piece of metal is continued from the metal wick-holder down into the reservoir, and by its conducting power gently raises the temperature of the fuel.

A small per centage of hydro-carbons of the benzole series comes over in the first operation. By treating it with nitric acid, nitro-benzole, and other substances valuable in perfumery, are eliminated.

After the first distillation, about three-fourths of the original material remains. This is fused and purified from extraneous ingredients by means of sulphuric acid. A black precipitate is thrown down, which, after being washed, resembles native asphaltum. The purified fluid is removed to a still, and heat is applied by steam through heated iron tubes. The distillates are arranged according to their distilling points, from 300 deg. to 600 deg. Fahrenheit. Those obtained at 430 deg. Fahrenheit, and upwards, contain paraffine.

It is stated, in the Memoir above referred to, that at 212°, 11 per cent. of fluid hydro-carbons distil over, entirely free from paraffine; that between 230° and 293°, 10 per cent. more fluid distils over, containing only a very small quantity of paraffin; that between 293° and 320° the distillate is very small in quantity; but from that to the fusing point of lead, 20 per cent. more is obtained, and although containing an appreciable amount of paraffine, it remains fluid at 32 deg. At this point of the distillation the products begins to solidify on cooling, and there is obtained 31 per cent. of a substance of a sufficient consistency to be submitted to pressure. On raising the heat considerably, 21 per cent. of fluids and paraffine distil over. In the last stage of the operation 3 per cent. of pitch-like matters are obtained, the residue in the still, consisting of coke containing a little earthy matter, amounts to 4 per cent.

The results of this distillation are given in the following table:—

At 212°, free from paraffine	11.0
230 to 293°, 293 to 320°, } a little paraffine	10·0
320 to fusing point of lead, containing paraffine, but still fluid at 320°	20·0
At about the fusing point of lead, sufficiently solid to be submitted to pressure	31·0
Beyond fusing point of lead, quantity of paraffine diminishes	21·0
Last distilled, pitchy matters	3·0
Residue in still, coke containing a little earthy impurity	4·0
	100·0

The above distillates are all lighter than water. Most of the paraffine may be separated from them by exposing them to a freezing mixture, so that no less than between 10 and 11 per cent. of this valuable solid hydro-carbon may be obtained from the Burmese naphtha.

We remember the surprise and curiosity expressed some years ago in the House of Commons when an Irish member, in moving the House in connection with one of the Irish peat companies, lighted a candle, and called attention to it as one of the products of those peat bogs, which hitherto had inflicted sterility on a large part of Ireland, but were now to become sources of unbounded wealth. Unfortunately, the yield of paraffine from the peat distillates proved to be too small to render the manufacture possible, although Dr. Sullivan states that 3 lbs. of paraffine could be separated from a ton of good dry peat, especially by keeping over the summer oils until the winter. The same remark is to some extent true as regards some other materials, and we know that the boghead cannel is in most demand as a source of carburetted hydrogen, although paraffine may be extracted from the tar of the gas works. A few years ago an action was brought by the patentees of a paraffine process against a gas company for the manufacture of paraffine in addition to that of gas. The defence was that the paraffine formed itself, and came over with the other secondary products, from which it was separated, not for sale, but for the purpose of lubricating their own machinery.

But in addition to the large proportion of paraffine contained in the Rangoon tar, there is another reason which causes it to be preferred to all other substances, as a source of that material, namely, its higher melting point, which better fits it for the making of candles; for while bog head paraffine melts at from 108° to 114° F.; bituminous coal paraffine at 110°; turf paraffine at 116°; Rangoon tar paraffine has a fusing point as high as 140°. Indeed the varying fusing points of this substance have led to the suspicion that pure paraffine has not in all cases been examined, when data of this kind were being sought for. Professor Anderson, of Glasgow, (British Association Report, 1856), speaks of two distinct kinds of paraffine as existing in bog-head cannel, one highly crystalline after fusion, the other a granular mass resembling bleached wax. The former melted at 114° F., the latter at 126°. A specimen from Rangoon petroleum melted at 142°, while one from peat melted at 116°, nevertheless, all these varieties gave, on analysis, the same results, namely:—

Carbon . .	85·08 per cent.
Hydrogen . .	15·33 ,,

Dr. Sullivan, some years ago, stated that none of the paraffines of commerce are definite bodies, but mixtures of different isomeric compounds. Dr. Antisell* also quotes an analysis by Filipuzzi, of a sample of paraffine made by Young, in Glasgow, from bituminous slate. It was white, crystalline, without odour or taste, of a specific gravity 861°, and a melting point 110°. It partially dissolved in alcohol, and separated by cooling. The mass when separated from the alcohol and placed under the microscope, showed three different forms:—needle crystals, angular grains, and glistening mother of pearl scales By further treatment he was able to separate nine distinct portions, each of which had a different melting point,

Variety—								
1	2	3	4	5	6	7	8	9
Temperature—								
113°	118°	120°	121°	123·5°	133·5°	136°	137°	139°
Constitution—								
C. 85·47			85·93			85·72	85·77	85·69
H. 14·29			14·23			14·31	14·21	14·29

Bolley states that most of the commercial paraffines contain stearic acid, that when paraffin is melted it is readily acted on by chlorine, when it gives off bubbles of hydrochloric acid gas, and retains some of the acid tenaciously. In the compound thus formed, some of the hydrogen is

* "The manufacture of Photogenic or Hydro-carbon Oils from Coals, &c."—New York, 1860.

replaced by chlorine; it is tolerably soluble in benzine, and the solution may be readily spread on paper, wood, &c. The name of chloroffine has been proposed for this substance. Bolley says that he has met with paraffine with as high a melting point as 149·9°, and Laurent has found it as low as 91·4°.

Leaving the question of the composition of paraffine to be settled by competent authorities, there can be no doubt as to the value of this beautiful substance as a candle-making material. The illuminating power is considerable. It is stated that a paraffine candle, weighing one-eighth of a pound, will give as much light as a spermaceti or stearine candle weighing one-sixth of a pound. The low temperature at which it fuses, and the high temperature to which it may be raised without decomposition, namely, upwards of 600° F. point it out as a valuable material for a bath for chemical purposes. The lubricating properties of the fluids obtained in the second distillation have already been referred to. Fixed oils are decomposable into acids which corrode metals; the paraffine oils have no such property, so that they do not corrode the metal bearings of machinery, nor is the brass work of lamps injured by the hydro-carbons burnt in them. As paraffine is not acted on by acids or alkalies, it has been recommended to guard, by means of paraffine, the stopples of bottles holding those substances. A paraffine paper for holding caustic alkali has also been suggested. And, lastly, we may remark, that paraffine realises the desideratum pointed out by Liebig many years ago of a solid olefiant gas, although it is somewhat singular, that in the last edition of his Chemical Letters, that great chemist still appeals to science to produce his favourite solid carburet of hydrogen.

DISCUSSION.

The Chairman said, whilst listening to this interesting communication on the history of paraffine, he could not refrain from thinking that the chemical investigation of the constituents of coal tar had yielded to the industrial arts some of the most valuable substances which of late years had been introduced into general use. It was well-known to the members of the Society, not only that these hitherto almost waste products acquired great commercial value from their production of the wax-like substance paraffine, but also the group of substances of the benzole class, (which, in the first instance, were regarded by chemists merely as scientific curiosities,) for it was from them that the beautiful new and brilliant dyes now so much in vogue were obtained. It was encouraging to those who prosecuted knowledge for its own sake, to find that the results of their investigations had become so valuable commercially. One thing occurred to him upon hearing the paper read, viz., that it might, perhaps, be discouraging to some of the older members of the Society to see those lines of scientific demarcation which were established for the sake of convenience, now so rapidly disappearing through the progress of investigation, particularly that between organic and inorganic chemistry. If anything could be said specially to belong to the dominion of organic chemistry, it was assuredly wax and the substances analogous to it; but here they produced, by a purely chemical process, beautiful substances which *might* be compared with wax, though it would be unjust to do so, for they possessed in a more perfect degree than wax those properties for which wax was valued. They contained no oxygen in their composition, but were pure hydrocarbons. He would not detain the meeting longer by observations of his own, but would now invite discussion upon this interesting paper.

Mr. Boccius inquired whether the boghead coal ought to be considered as a species of shale, the same as paper shale, or as it was termed in Germany the leaf shale of the Rhine, or whether it was a schistus, like that found at Wareham and other parts of Dorsetshire and in Derbyshire; because the shales of Derbyshire were of a different colour to those of Dorsetshire and Portland. In some of the cuttings of railways in Derbyshire, the shale was of a perfectly black colour, and so hard that it was with difficulty blasted. The distinction made by Mr. Young was, that the boghead coal, which was a bituminous mass, was not the same substance as the bituminous shale or leaf shale. It was a curious fact that every description of shale hitherto discovered had its own distinctive properties and qualities. What he wished to know was, whether the boghead coal was considered to be of the same family as the shales?

Mr. G. F. Wilson, F.R.S., said, in this very able *résumé* of all that was known upon this subject, he had to thank Mr. Tomlinson, personally, for several matters with which he was not previously acquainted. In following through the dates in which were traced the different steps by which the practical discovery of paraffine oils was made, there was one which had not been mentioned, which was in May, 1845; and as he (Mr. Wilson) happened to be one of the patentees at that time, he might state that what was described there as distilling schist, in connection with superheated steam, was a process which had been worked by him for three years previously. In 1842 a a patent was taken out for distilling superheated steam, and this process was afterwards applied to the distilling of bituminous bodies. There was another small point he would mention. In describing the lamp which was termed a modification of the old cocoa-nut oil lamp, it should be added that the latter was the invention of one those wonderful people who were good at everything they undertook—Lord Dundonald. The contrivance was, placing a reservoir over the flame, by which the cocoa-nut oil was rendered sufficiently fluid to burn properly. The lamp which had been spoken of that evening scarcely merited to be called an invention, as it merely consisted of a piece of metal so connected with the lamp as to conduct the heat to the hydro-carbon, and render it sufficiently limpid to rise in the wick of the lamp, which it could not otherwise do.

Mr. Thos. Hilton would call attention to the commercial importance of this substance, as shown by a few statistics, which he believed might be implicitly relied upon. At all events, they were not at all in excess. He had been informed that during the last six months, paraffine oil had been made in Scotland from the Torbanehill mineral, to the extent of 26,000 gallons weekly, which represented a money value of £2,350 per week, and of that quantity two-thirds was oil for burning, and one-third for lubricating. The solid paraffine made in Scotland at the present time represented a value of £450 or £500 weekly. He had taken some pains to ascertain what quantity of this oil was imported from Germany, for during the last six months they had obtained large quantities of oil there from shale, and from all the sources of information he learnt that during the last six months they had received from Germany about 120,000 gallons, of the value of £15,000. It might be supposed the exact returns could be obtained from the Board of Trade, but paraffine was included amongst the number of unenumerated articles. In addition to this there were manufacturers of this oil in England. There was the Asphalte Company at Millwall, and the works at Wareham, though he believed the latter were not now in operation. Perhaps Mr. Wilson could inform them what quantity of that beautiful substance known as Belmontine oil was produced at the works which he superintended. Then there was the Rangoon oil distilled by Sir Charles Price and Co., and he believed they were not able to meet the demand for it. At the present time numerous shops were to be seen all over London, with lamps bearing a label, "This lamp burns eight hours at the cost of a penny," and if that was the real value of the oil, it was most valuable to the working classes and those who studied economy. But one great objection had been felt, that during the last six months they could not get a sufficient supply of the oil to meet the demand, and people had become tired of going to ask for it. As he believed the term "finality" was not admitted by chemists, so they might presume they had not yet arrived at the full

extent of knowledge as to these hydro-carbons. One of the chief burning oils had an unpleasant odour, and the next great step was to try and get rid of that odour; and if that were effected, there was no knowing to what extent the use of these oils would be carried. Considering the very high price which tallow had reached, he knew of nothing in commerce more worthy of the study of the chemist than bringing to greater perfection burning oils of this character. It seemed singular that the Belmontine oil, produced from the Rangoon tar, had very little odour, and that not an unpleasant one, whilst the oil produced from the Torbane mineral had a very unpleasant smell, though the solid product from the same material was nearly inodorous.

Mr. P. L. Simmonds said the members of the Society could not but be under obligations to so well-informed a gentleman as Mr. Tomlinson, for the interesting commercial history of a very important product which he had laid before them. It seemed to be wisely ordained that the skill and research of man should be permitted to bring to light at the time when they were most required to promote arts and manufactures, or to enhance his comforts and conveniences, new substances to supply those which had become deficient. Of late years we had in a great measure given up the whale fisheries, our ships finding more steady and profitable employment in the carrying trade of the world. The Americans, too, who had entered more largely upon this adventurous pursuit, were withdrawing many of their vessels from the fishing, and hence the whaling fleet was reduced and the produce diminished. The vast extension of machinery and the demands of social life led to a greater demand for oils for illumination, lubricating, and for the woollen manufacture. Even the vegetable oils, palm, cocoanut, rape, and other seed oils, which were obtained in such large quantities, were found insufficient to supply the wants of commerce, and new sources of oil were sought for from mineral bases. The question of the distillation of coal oils, and the various sources of petroleum and earth or rock oils, had, within the last year or two, attracted a very large share of attention, and several important works had been published in connection with the subject. The native sources of petroleum, naphtha, and asphalte, were already known to be very numerous, and would no doubt, as commerce extended, become even more numerous still. In many parts of Europe, Asia, and America they already formed objects of commercial importance, and he believed their use would be further greatly promoted and the retail price of the oils reduced. The manufacture of mineral oil bade fair to assume a good position among our industrial enterprises, notwithstanding the comparatively small amount of labour that had been spent in the endeavour to perfect the processes. A short time since a bonus of £500 was offered to any scientific or manufacturing chemist who would furnish the advertiser with a cheap and efficient process of deodorizing mineral oil, and now that attention was drawn prominently to this subject, no doubt some beneficial result would ensue. Coal oil had been substituted in New Brunswick, and he believed in some others of the North American colonies, for seal oil in the lighthouses, and the result was a more brilliant light with the consumption of a trifle more than half the quantity of oil required previously. Seeing so many gentlemen well informed on the subject present, he did hope that some further information respecting this highly useful manufacture might be elicited.

Mr. Boccius hoped to have an answer to the question he had put. He might state that he was personally acquainted with Count Hompesch, who took out a patent in this country for the distillation of schistus, and a lease was granted to him by the government of a portion of the northern part of the Island of Portland. He worked the schistus of that district for some time, but all his efforts to get rid of the unpleasant odour were ineffectual. The manufacture occasioned great disgust wherever it was carried on. As regarded the commercial value of these oils no doubt it was of the first importance. On one occasion he gave an engineer a portion of the thinner oil which was used for lubricating the bearings of a wheel which performed 2000 revolutions per minute, and the surprise was that the oil never became hard. With regard to the residue after the thin oil was distilled, they obtained a powerful naphtha from it, which was the best known detergent for cleaning cloth, and from the refuse a charcoal was obtained which was valuable as a manure. If they could get rid of the odour they would have at once a fine burning oil, which he believed would supersede gas and every other kind of illumination, because no other oil gave so pure and brilliant a light as paraffine.

Mr. Tomlinson said that the boghead cannel was a purer kind of hydro-carbon than many of the Dorsetshire shales, which were all more or less impregnated with fossil remains, and these he thought were most probably the cause of the offensive odour of the oils and other distillates from that class of shale. He was not aware that any fossil remains had been discovered in the boghead cannel.

Professor Tennant said that many shales afforded these substances, and there were some descriptions of shales which had not yet been tested. He could particularly mention a remarkable kind which had been discovered in New Zealand, and which, he believed, had never yet been tried. A specimen of it had been given him by Lord Alfred Churchill, but up to the present time he had not had an opportunity of doing anything with it; he should, however, be happy to place it in the hands of any chemist who would be willing to test its properties. It was a substance very much like asphalte, and gave forth a pleasant odour, and the discovery of it was made in this way: Some persons were cooking some food, and to their astonishment, after the wood was burnt out, the rock continued to burn for several hours. To his mind, it appeared that this material was likely to yield a large quantity of oil. With regard to the bog-head material, it was a disputed point with geologists whether it was a coal or not. The geologist must define what was coal. Not every black material so called was coal. If they asked whether this boghead material belonged to the geological formation derived from wood, he should say certainly not. There were some materials of this class from Italy—the pure coal class—which emitted a most disagreeable odour. He had no doubt the boghead cannel was produced by volcanic action from rocks beneath, distilling over into the superincumbent material certain substances from the more ancient fossiliferous rocks. They had a bitumen from Cuba and Trinidad, which was brought up to the surface of the ground, whereas boghead was never brought naturally to the surface, which was very likely owing to the superimposed rocks and thick seams of clay overlaying it.

Professor Miller believed the offensive odour of the products derived from the shales of Dorsetshire to be greatly owing to the presence of sulphurous compounds. The shale contained pyrites, which, when distilled, yielded a great deal of sulphur; and those sulphurous bodies, when formed, were the most troublesome to get rid of. As they had heard that these products could be obtained from Rangoon tar quite inodorous, he hoped, as they proceeded with the investigation, they should eventually get rid of those offensive odours in the products from the shale of this country.

Mr. S. W. Brooks would be glad to be informed whether this oil, which was likely to become extremely popular, could be burned in the now almost discarded camphine lamps. The argand lamp, which was at one time very popular, was superseded by the camphine lamp, which in its turn was superseded by the moderator lamp; and it was now to be apprehended that the latter would be discarded in favour of the new lamp which had been designed for burning the paraffine oil. He should be glad to know whether, by the introduction of this oil, all the previous forms of lamps would be superseded.

Mr. Tomlinson thought Mr. Wilson was best able to answer that question.

Mr. WILSON was afraid the camphine and other lamps would not answer for this oil.

Mr. BOCCIUS remarked that these oils required a larger amount of oxygen for their combustion than most other oils, and, therefore, with the old form of lamp they could only get a comparatively small flame. The moderator lamp would not answer, on the score that this oil was rather ethereal, and the wick could be burnt dry without carbonising it. The new American lamp received a charge of air from the centre of the wick, like the old Argand, and when thus aerated gave a most splendid light.

Mr. BROOKS remarked that it simply came to the question whether all the previous lamps would be superseded by this new oil.

Mr. TOMLINSON said whilst the tradesmen of France were advertising these burning fluids, they advertised at the same time lamps especially constructed for the purpose; so that he was afraid there was not much hope for the employment of their old lamps.

Professor MILLER said it was stated upon a recent trial that one house in Glasgow had made nearly a quarter of a million of lamps adapted for burning this particular oil.

Mr. P. H. HOLLAND, referring to the specimens exhibited upon the table, said, with some of those hydro-carbons he was well acquainted, but there were others upon which he should be glad to receive a little explanation.

Mr. TOMLINSON said the specimens of the larger quantity were from the manufactory which Mr. Wilson managed, and perhaps that gentleman would give the explanation which had been asked for.

Mr. WILSON said the Rangoon petroleum was the only source of hydro-carbon with which he had had any large experience. They had all been mentioned in the paper. They started with a substance about the consistency of honey, which oozed out of the ground, and was procured in the state they now saw it, and was so received at the works. The first course of distillation brought off a fluid having very much the properties of benzole, but without its chemical character—a very light fluid indeed. Some of the first part that distilled off was so exceedingly volatile, that some small quantities which he gave to distinguished chemists volatilised from the heat of the hand acting on the bottle. The next product after this fluid, which was used for taking out grease stains, was the material which Mr. Brooks was apprehensive would "extinguish" the lamps he at present used. It was a body of the same class, as a burning fluid, as that used for the lamps which Dr. Miller had spoken of as being made in such large numbers in Glasgow; a very fluid oil, which had the advantage of having been distilled in the processes of nature, which were so superior to anything that man had arrived at. It was distilled apparently at an immense pressure under the earth, with the pressure of water. It might be said to be the natural distillation of the material with super-heated steam, and it had not the unpleasant smell which existed more or less in all those bodies artificially distilled. As in all distillation from schist or coal, immense heat was required before the oil was set free from the material which contained it. After this was distilled, they came to a material which was still a light body, and was known as Belmontine or Paraffine oil, which was the oil to be burned in the new form of lamp alluded to, the only difference between those lamps and the Belmontine lamps being, that there was a little piece of heat-conducting metal, to render the oil for the time being as limpid as the other burning oils in use. The next process was the production of a heavier kind of oil, which, mixed with other oils, was used as a lubricant in the place of sperm oil. After that came the oil which yielded the solid matter from which the candles now exhibited were made.

Mr. HILTON remarked that the camphine lamp was superseded in a great measure owing to the great rise in the price of the camphine after it was introduced, and, being made from turpentine, the supply was not adequate to the demand, and the price rose from 3s. to 6s. per gallon, which rendered it no longer an article of economical consumption for lighting purposes. He should be very glad to see Mr. Young remunerated by the government in the way he deserved, so that the manufacture of this oil might be thrown open, when he believed it would be produced in such abundance as that it could be sold for 2s. per gallon.

Mr. TOMLINSON remarked that Mr. Young's patent would expire in about two years.

Mr. HILTON inquired whether there was a probability of obtaining any large supply of this oil from America?

Mr. TOMLINSON replied, as far as his information extended, they were at present unable to meet the home demand.

The CHAIRMAN, in proposing a vote of thanks to Mr. Tomlinson for his paper, beggged to make one remark in connection with the singular wish expressed by Liebig many years ago, which was one he (the Chairman) could never quite understand. It was, that they might have a gas either in a liquid or solid form. The difference between gas as they now used it and other combustible bodies of similar composition,—in fact the true value of gas, rested upon the circumstance that it was gaseous. Physical research had shown that olefiant gas was of the same chemical composition as certain kinds of paraffine, and he believed there was no ground for doubting that the circumstance of more heat being evolved by the combustion of an ounce of olefiant gas than by that of an equal quantity of paraffine in a solid form, was the cause of the greater amount of light emitted by the former during the process of combustion. The practical reason for introducing this remark was to mention that his friend Dr. Frankland had made a very beautiful lamp, which seemed adapted for giving to paraffine oil what it wanted, viz., the making it a gas. The lamp consisted of a small argand burner, with two concentric glass chimneys, one narrow and tall, and the other wide and short, and so arranged that the air which supplied the flame passed between the two chimneys in the annular space, becoming heated in going down. In fact, it was a hot-blast burner. He was not sure whether this lamp had been published, but Dr. Frankland had mentioned to him that ordinary gas, burnt under these conditions, would give forty per cent. more light than when burnt in the ordinary manner with an argand chimney. It seemed to him to be a direction in which it was worth while to try and improve those lamps which were now being made for the combustion of these valuable oils. He now begged to propose—what he was sure the meeting would cordially agree to—a vote of thanks to Mr. Tomlinson for his valuable communication.

A vote of thanks was then passed.

The paper was illustrated by specimens of paraffine and similar preparations, as well as the materials from which they are obtained, and the candles manufactured from them. These were contributed by Mr. G. F. Wilson, F.R.S., of Price's Patent Candle Company, and by Messrs. Hilton and Rider, to whom the thanks of the Society are due.

The Secretary announced that there would be no meeting on Wednesday next, it being Passion week, and that on Wednesday the 3rd of April, a paper "On Economic Contrivances and Labour-Saving Machines used in the United States of America," by Dr. C. W. Eddy, M.A., M.B., formerly Travelling Fellow of the University of Oxford, would be read.

INTERNATIONAL EXHIBITION OF 1862.

The following is a list of articles on which customs duties are now levied, showing the duties payable in each case. Those articles which are marked with an asterisk will be relieved from duty before the Exhibition of 1862.

Marked thus (†) 5 per cent. additional duty to be charged.

Articles		Duty. £	s.	d.
*Almonds, Paste of (until 1st July, 1861)	lb.	0	0	2
Arrowroot	cwt.	0	0	4½
Barley, Pearled	,,	0	0	4½
Beer or Ale	Barrel of 32 Gallons	1	0	0
,, Mum	,, ,,	1	0	0
,, Spruce	,, ,,	1	0	0
,, of other sorts	,, ,,	1	0	0
Biscuit and Bread	cwt.	0	0	4½
Books, being of editions printed in or since the year 1801, bound or unbound,	cwt.	0	16	0
,, admitted under treaties of international copyright, and of and from a British Possession	cwt.	0	15	0
Cards, viz., Playing Cards	Dozen Packs	0	15	0
Cassava Powder	cwt.	0	0	4½
*Cherries, dried, till 1st July, 1861	lb.	0	0	2
Chicory, raw or kiln dried	cwt.	0	6	0
,, roasted or ground	lb.	0	0	4
Chloroform	lb.	0	3	0
Cocoa	lb.	0	0	1
,, Husks and Shells	cwt.	0	2	0
,, Paste or Chocolate	lb.	0	0	2
Coffee	lb.	0	0	3
,, kiln-dried, roasted or ground	lb.	0	0	4
*Comfits dry, till 1st July, 1861	lb.	0	0	2
*Confectionery ,, ,,	lb.	0	0	2
*Corks, ready made, till 31st March, 1862,	lb.	0	0	3
Corn, Grain, Meal and Flour, viz.—Wheat Barley, Oats, Rye, Peas, Beans, Maize or Indian Corn, Buck Wheat, Bear or Bigg	quarter	0	1	0
,, Wheat Meal and Flour, Barley Meal, Oatmeal and Groats, Rye Meal and Flour, Pea Meal, Bean Meal, Maize or Indian Corn Meal, Buck Wheat Meal, and meal not otherwise enumerated	cwt.	0	0	4½
Currants	cwt.	0	7	0
Dice	pair	1	1	0
Essence of Spruce	for every £100 value	10	0	0
Figs	cwt.	0	7	0
Fig Cake	cwt.	0	7	0
Furniture Woods, unenumerated, not being Ash, Beech, Elm, Birch, Oak, Wainscot	ton	0	1	0
*Ginger, preserved, till 1st July, 1861	lb.	0	0	2
*Hats or Bonnets, till 31st March, 1861:—				
,, Chip	lb.	0	1	3
,, Bast, Cane, or Horse-hair	lb.	0	1	3
,, Straw	lb.	0	1	3
*Hops, from January 1st to 31st December, 1861	cwt.	1	0	0
* ,, from and after 1st January, 1862,	cwt.	0	15	0
Malt	quarter	1	5	0
Mandioca Flour	cwt.	0	0	4½
Manna Croup	cwt.	0	0	4½
*Marmalade, till 1st July, 1861	lb.	0	0	2
Mill Boards	cwt.	0	16	0
Paper, viz.—Brown Paper, made of old rope or cordage only, without separating or extracting the pitch or tar therefrom, and without any mixture of other materials therewith	cwt.	0	16	0
,, Printed, painted or stained paper-hangings, or flock paper	cwt.	0	14	0

Articles.		Duty. £	s.	d.
,, Waste paper, or paper of any sort not particularly enumerated nor otherwise charged with duty	cwt.	0	16	0
,, Gilt, stained, coloured, embossed, and all fancy kinds, not being paper-hangings	cwt.	0	16	0
,, Millboards	,,	0	16	0
Pasteboard	,,	0	15	0
†Pepper of all sorts	lb.	0	0	6
Pickles preserved in vinegar	gallon.	0	0	1
Plate of gold	oz. Troy.	0	17	0
,, silver	oz. Troy.	0	1	6
Plums—French and Prunellos	cwt.	0	7	0
,, dried or preserved (except in sugar) not otherwise described	cwt.	0	7	0
* ,, Preserved in sugar, till 1st July 1861	lb.	0	0	2
Potato flour	cwt.	0	0	4½
Powder—Hair	,,	0	0	4½
,, Perfumed	,,	0	0	4½
,, Not otherwise enumerated, that will serve the same purpose as starch	cwt.	0	0	4½
Prints and Drawings, viz.:—				
,, Plain or coloured	cwt.	0	16	0
,, Admitted under treaties of international copyright	cwt.	0	15	0
,, Or, and at the option of the importer, Single	each.	0	0	0½
Bound	dozen.	0	0	1½
Prunes	cwt.	0	7	0
Raisins	cwt.	0	7	0
Rice dust for feeding cattle	,,	0	0	4½
Sago and sago flour	,,	0	0	4½
Semolina	,,	0	0	4½
Ships—Foreign-built, of wood, and all ships built of wood in a British possession abroad, on registration as British ships in this country; no deduction to be allowed on account of engine-room or otherwise	ton.	0	1	0
Spirits or Strong Waters, not being sweetened or mixed with any article, so that the degree of strength thereof cannot be ascertained by Sykes' hydrometer	proof gallon.	0	10	5
,, Of and from a British possession in America, or the Island of Mauritius, and rum of and from a British possession within the limits of the East India Company's charter, in regard to which the conditions of the Act 4 Vict., cap. 8, have or shall have been fulfilled	proof gallon.	0	10	2
,, Rum shrub, cordials, and liqueurs, of and from a British possession in America, or the Island of Mauritius, or a British possession within the limits of the E. I. Company's charter, qualified as aforesaid	proof gallon.	0	10	2
,, Rum of and from any foreign country, being the country of its production	proof gallon.	0	10	2
,, Rum from any country, not being the country of its production,	proof gallon.	0	10	5
,, Tafia, of and from any colony of France	proof gal.	0	10	2
,, other spirits, being sweetened or mixed, so that the degree of strength cannot be ascertained, as aforesaid, and perfumed spirits, to be used as perfumery only	proof gal.	0	14	0
Starch	cwt.	0	0	4½
,, Gum of, torrified or calcined	cwt.	0	0	4½

Articles.		Duty.		
*Succades—including all fruits and vegetables preserved in sugar, not otherwise enumerated, until 1st July, 1861 ...	lb.	0	0	2
*Sugar—until 1st July, 1861:—				
„ Candy, brown or white, refined sugar, or sugar rendered by any process equal in quality thereto	cwt.	0	18	4
„ White clayed sugar, or sugar rendered by any process equal in quality to white clayed, not being refined, or equal in quality to refined	cwt.	0	16	0
„ Yellow Muscovado and brown clayed sugar, or sugar rendered by any process equal in quality to yellow Muscovado or brown clayed, and not equal to white clayed	cwt.	0	13	10
„ Brown Muscovado, or any other sugar, not being equal in quality to yellow Muscovado or brown clayed ...	cwt.	0	12	8
„ Cane juice	cwt.	0	10	4
„ Molasses	cwt.	0	5	0
Tapioca	cwt.	0	0	4½
*Tea, until 1st July, 1861	lb.	0	1	5
†Tobacco, unmanufactured, stemmed, or stripped	lb.	0	3	0
† „ Unmanufactured, unstemmed...	lb.	0	3	0
† „ Manufactured or cigars ...	lb.	0	9	0
† „ Snuff	lb.	0	6	0
Varnish—containing any quantity of alcohol or spirits	gallon	0	12	0
Vermicelli or maccaroni	cwt.	0	0	4½
Vinegar	gallon	0	0	3
Water—Cologne, the flask (30 of such flasks, containing not more than 1 gallon),	each	0	0	6
„ When not in flasks, as perfumed spirits,	gallon	0	14	0
Wood and Timber (23 Vict. cap. xxii.):—				
„ Hewn, viz., Fir	load	0	1	0
„ „ Oak	„	0	1	0
„ „ Teak and Trenails ...	„	0	1	0
„ „ Greenheart	„	0	1	0
„ „ Red and blue gum ...	„	0	1	0
„ „ Stringy bark	„	0	1	0
„ „ Mora, locust, and other sorts used in shipbuilding,	load	0	1	0
„ „ Unenumerated ...	„	0	1	0
„ Firewood	„	0	1	0
„ Lathewood	„	0	1	0
„ Masts, spars, and poles	„	0	1	0
„ Sawn or split planed, or dressed	„	0	2	0
„ Hoops	„	0	2	0
„ Shovel hilts	„	0	2	0
„ Furniture and hardwoods ...	ton	0	1	0
„ Staves, not exceeding 72 inches in length, nor 7 inches in breadth, nor 3½ inches in thickness (except staves for herring barrels)	load	0	1	0
„ Staves exceeding 72 ins. in length,	load	0	2	0

WINE CONTAINING LESS THAN THE FOLLOWING RATES OF PROOF SPIRIT, VERIFIED BY SYKES'S HYDROMETER.

From and after 1st January, 1861.	18 Degrees. Duty.		26 Degrees. Duty.		40 Degrees. Duty.		45 Degrees. Duty.	
	s.	d.	s.	d.	s.	d.	s.	d.
Of and from Foreign Countries:—								
Red .. .. gallon	1	0	1	9	2	5	2	11
White ... ... gallon	1	0	1	9	2	5	2	11
Lees ... ... gallon	1	0	1	9	2	5	2	11
The growth and produce of a British Possession:—								
Red ... ... gallon	1	0	1	9	2	5	2	11
White ... ... gallon	1	0	1	9	2	5	2	11
Lees ... ... gallon	1	0	1	9	2	5	2	11

When imported in bottles, and containing less than 40 degrees of strength, to be charged 2s. 5d. per gallon.

Wine containing 45 per cent. of proof spirit and upwards, to be charged as mixed spirits.

Home Correspondence.

ARRANGEMENT IN THE FORTHCOMING EXHIBITION OF 1862.

Sir,—As I was unfortunately prevented from being present at the discussion of my paper last week, I venture to trouble you with a few lines in reference to the discussion.

In reply to Mr. Cole, I would suggest that, if the exhibitors are to be left to arrange and place their collections according to their own ideas of value and interest, the result can only be a scramble for what are considered the best places, and a vast accumulation of valuable material rendered utterly valueless for want of system. I may also remark that I appreciate, perhaps, as highly as Mr. Cole himself, the advantage of obtaining the services of exhibitors to arrange for themselves, and to elect for themselves, where their collections shall appear, but this is by no means inconsistent with the establishment of a system by which the framework of arrangement is so far secured that the exhibitor can hardly fail to put himself in the right place. Without this, days may be wasted in the vain attempt to compare the similar manufactures of different exhibitors, or obtain an idea on any subject that could lead to useful results. I regret to observe an idea that seems to prevail, of somthing approaching to antagonism between science and practical results, but I feel sure that neither Mr. Cole, nor any of those who agreed with him, can really mean that science and scientific principles should be ignored in deciding on the principles to be adopted in the arrangement of the coming Exhibition.

I would suggest to Mr. Maskelyne that he should consider how far the exhibition of a superb collection of mineralogical curiosities is consistent with the plan of the proposed Exhibition, were it not enough to remind him of the reply that must be anticipated were application made to remove from this country any of the rich treasures under his charge at the British Museum. It is quite unreasonable to suppose that national collections will be sent out of any country for temporary exhibition abroad. Mr. Maskelyne, however, is prepared to regard accumulation as everything and arrangement nothing—an idea not original, but not at present very generally entertained.

The objection raised by Mr. Hilton is only an illustration of the desirableness of adopting some definite principle of arrangement. The singular production of beautiful candles from dirty mineral is just one of those things that ought to be shown. The exhibitor may and should exhibit his candles in two classes—in one as productions from a certain raw material, in the other as finished manufactures competing with other similar manufactures from different sources.

In conclusion, I venture still to hope that, by a careful consideration beforehand of what ought to be exhibited, and what may be expected to arrive, a definite plan may be prepared in a skeleton form, the final filling up of which may safely be left to exhibitors themselves under reasonable superintendence. I am satisfied, from the discussion that took place, that much remains to be learnt on all sides before the exact plan can be sketched, and I am quite content to have been found fault with by everybody, if, from my imperfect suggestions, a practical result is arrived at. I am, &c.,

D. T. ANSTED.

Athenæum Club, March 16, 1861.

Proceedings of Institutions.

Manchester Mechanics' Institution.—The thirty-seventh annual meeting of the members of this institution was held on Thursday, February 28, in the lecture hall of the institution. The president, Oliver Heywood, Esq., occupied the chair; and amongst those present were Mr. Wm. Fairbairn, F.R.S., the mayor of Manchester (M. Curtis, Esq.,) Mr. John Heywood, Mr. D. Chadwick, Mr. Pisa, Professor Crace Calvert, Dr. Orges, Mr. R. Rumney, Mr. D. Morris, Dr. Watts, Mr. Edge, &c. Mr. Marshall, the secretary, read the annual report, of which the following is an abstract:—"The first topic referred to is the gratifying increase in the number of male members. The number of quarterly male members at Christmas, 1860, was nearly 750 (exclusive of boys in the day school), against 600, the number at the same period in 1859. The number of pupils in the boys' day classes is slightly less than last year, but the efficiency of this department of the institution remains unimpaired, as is shown by the results of the last middle-class examinations in connection with the University of Oxford. On that occasion, fourteen candidates from this school went up for examination—three seniors and eleven juniors—of whom seven passed, two of them receiving not only certificates but also prizes. The whole of the candidates passed in chemistry, and several in both mathematics and chemistry, the failure to pass entirely being in most cases due to a break-down in the preliminary examination. As many candidates from this school passed in chemistry as passed in that subject collectively in Birmingham, London, Leeds, and Liverpool. In the ladies' day classes the numbers are about the same as last year, and the only topic worthy of special remark is the resignation of Miss Pilcher, the late lady principal, to whose long and valued services in connection with the institution allusion is made in suitable terms. The evening classes have been unusually active during the winter, the total number of names on all the class books being scarcely short of 2,500. The classes for writing, reading, elementary arithmetic, dictation, and elementary science, have been especially crowded, and the members are congratulated on the fact that, in this department, the institution is doing its legitimate work, viz., imparting instruction to working men and youths. The mechanical drawing class has almost doubled its numbers, and the French and German classes are also larger and more active than for some time past. Reference is then made to the recent establishment of free classes, conducted by gratuitous teachers. To Mr. Henry Pitman is due the credit of originating the movement, and his class for the study of phonography, numbering over 200 members, has been quite a feature in the institution during the winter. A similar class for the study of chemistry has also been established, the directors having been able to avail themselves of a kind offer of gratuitous teaching received from Mr. John Angell; it numbers about sixty members. Another free class for learning to sing on the tonic sol-fa method, with about seventy members, has been established under Mr. R. Griffiths, another gratuitous teacher; and the members are recommended to pass a cordial vote of thanks to the whole of the gentlemen named. The examinations in connection with the Society of Arts are next adverted to. The directors conclude their survey of the year's educational operations with a eulogy upon the zeal and fidelity displayed by the teachers and professors in the discharge of their important duties. In connection with the library, the issue of the new catalogue is mentioned, and also the fact that the subscription to Mudie's library has been doubled during the past year, with obvious advantage to the convenience of the members. The circulation of books during the year has considerably exceeded that of 1859, while the demand for works of fiction has fallen off. The exhibition of dissolving views, commenced in December, 1859, yielded altogether a net profit of about £300,—a favourable result, considering the absence of novelty, and the many adverse circumstances that had to be contended against. The directors, after careful deliberation, resolved to discontinue the exhibition during the present winter, and to devote the energies of the management to the legitimate work of the institution. Of the wisdom of this decision, the prosperous state of the classes during the winter may be taken as some guarantee. The Christmas party, held in December last, was designed to effect some improvement in the funds of the institution, and it is to be regretted that the excellent programme provided for the occasion failed to attract so many visitors as had been relied upon. The formation of a gymnasium and a gymnastic club is referred to, as supplying a want long felt and pointed out. The club now numbers nearly seventy members, and is governed by its own committee and officers, two only of the directors of the institution being members of the committee *ex-officio*. The report concludes with a reference to the balance-sheet, the net financial result of the year's operations being a loss of £139 13s. 6d. The extraordinary expenditure in connection with alterations and repairs, however, sufficiently accounts for the deficiency. The directors conclude their statement with the earnest expression of opinion that the extinction of the mortgage debt, and the consequent removal of the interest charges, is a measure demanding the serious attention of the managers and friends of the institution.—The Secretary also read the statement of the income and expenditure, from which it appeared that the income for the year had been £3,631 14s. 7d., and the expenditure £3,771 8s. 1d., showing an access of expenditure over income of £139 13s. 6d.—The Chairman moved the adoption of the report. He said the report commenced with stating that the male members had increased from 600 to 700, and ended by telling the incoming board of directors that there was one matter that weighed heavily upon them—that was the debt of £2,000 upon the institution, which it was essential to the prosperity of the institution should be removed as speedily as possible. He then commented upon the leading points of the report, and concluded by wishing prosperity to the institution.—Mr. John Heywood seconded the resolution.—The Mayor of Manchester moved a vote of thanks to the members of the retiring board of directors.—Councillor Chadwick seconded the resolution. Whilst thanking the retiring directors, he expressed a hope that the incoming directors would do better than the directors of last year, and not leave a debt of £139 on the year's working. He suggested that there should be an amalgamation of the Mechanics' Institution and the Working Men's College, as a union of the two institutions in Salford had led to uninterrupted prosperity.—The resolution was carried.—Professor Crace Calvert moved a vote of thanks to those who had during the last year given donations to the library and other departments of the institution.—Mr. David Morris seconded the resolution, which was carried.—Mr. R. Rumney moved a vote of thanks to several gentlemen for services rendered.—The resolution was seconded and carried; and a vote of thanks to the chairman terminated the proceedings. The following resolution was also passed with applause:—Moved by Wm. Fairbain, LL.D., F.R.S., and seconded by Dr. John Watts:—"That the best thanks of this meeting be given to Messrs. Pitman, Angell, and Griffiths, for their valuable services in connection respectively with the free phonography, chemistry, and singing classes."

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Actuaries, 7. 1. Mr. Porter, "A Communication from Mr Gompertz." 2. Mr. Sprague, "The Graduation of the Series giving the Expectation of Life, and the Nature of the Corresponding Curves."

Geographical, 8½. 1. Mr. F. T. Gregory, "Report on the Organisation of the Exploring Expedition from Perth to the N.W. Coast of Australia." 2. Mr. A. C. Gregory, "Memoranda on Ports of N.E. Australia," with "Report

on Exploring Expedition to the Burdekin River," by Mr. J. W. Smith. 3. "Expeditions in South Australia, by the Governor, Sir R. Mc Donnell, and Major Warburton."
Medical, 8½. Mr. J. Gay, "On Abdominal Bands as Causes of Intestinal Obstruction."
TUES. ...Civil Engineers, 8.
Medical and Chirurg., 8½.
Zoological, 9.
WED. ...R. Soc. Literature, 4½.
Archæological Assoc., 8½.
THURS...Roy. Soc. Club, 6.
Philological Club, 8.
SAT. .....Chemical, 8. Anniversary.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 1st March, 1861.

Par. Num.
29. Railway and Canal Bills (24. Exeter and Exmouth; 25. Great Northern and Western of Ireland; 26. Great Northern (Doncaster to Wakefield) (Purchase of Hertford, &c, Railway); 27. Great North of Scotland; 28. Hereford, Hay, and Brecon; Horsham and Guildford Direct; 29. Inverness and Aberdeen Junction, &c., &c.; 30. Kilrush and Kilkee, and Poulnasherry Reclamation; 31. Kirkcudbright; 32. Lancashire and Yorkshire (Branches to Shawforth, &c.) (Extension to Settle) (New Line, &c.) (Wigan to Clifton, &c.); 33. Leeds, Bradford, and Halifax Junction; 34. Leven and East of Fife (Amalgamation, &c.) (Extension, &c.); 35. Limerick and Foynes; 36. Llantrissant and Taff Vale Junction; 37. London and North Western, Lancaster, and Carlisle and Caledonian; 38. London and North Western, and Manchester, Sheffield, and Lincolnshire (Manchester London Road Station); 39. Ludlow and Clee Hill; 40 Lynn and Hunstanton; 41. Manchester, Sheffield, and Lincolnshire (Additional Works) (Manchester Extension); 42. Margate (Ramsgate Extension) (Marton and Harbury);—Board of Trade Reports.
40. Bills—Metropolis Local Management Acts Amendment.
41. " Metropolis Local Management Act (1855) Amendment.
46. " Recovery of Debts.
47. " Valuation (Scotland) Acts Amendment.
50. " Smoke Nuisance (Scotland) Act Amendment.
51. " Constructive Notice Amendment.
52. Indictable Offences (Metropolitan District.)

SESSION, 1860.

545 (1). Navy (Gun and Mortar Boats)—Supplementary Appendix to the report.

Delivered on 2nd and 4th March, 1861.

49. Poor Rates—Return.
62. East India (China War)—Return.
38 (1). Trade and Navigation—Accounts (31 January, 1861).
66. Committee of Selection—Third Report.
65. Railway and Canal Bills—Second Report from Committee.
63. Mr. Turnbull—Copy of Correspondence, &c.
70. Harbour, &c. Bill (Mersey Docks and Harbour; 1. Upper Mersey Dues; 2. Kingston-upon-Hull Docks (Capital) (New Works), Hull West Dock; 3. New Ross Port and Harbour);—Board of Trade Reports.
60. Local Acts. 1. Blyth and Tyne Railway; 2. Cleveland Railway; 3. North Eastern (Blaydon to Conside) Railway; 4. Lancashire and Yorkshire (Wigan to Clifton) Railway; 5. Manchester, Sheffield, and Lincolnshire (Additional Works) Railway; 6. Monmouthshire Railway and Canal (New Lines, &c.); 7. Newcastle-upon-Tyne, Derwent, and Weardale Railway; 8. South Eastern (Folkestone Harbour Communication) Railway; 9. Southampton and Netley Railway; 10. South Wales Mineral Railway; 11. Kilrush and Kilkee Railway and Poulnasherry Reclamation; 12. Nantile Railway)—Admiralty Reports.
29. Railway and Canal Bills. 43. Mid Devon and Cornwall; 44. Midland (Additional Powers) (Ashchurch and Evesham Line) (Otley and Ilkley Extension) (Tibshelf and Nuneaton) (Whiteacre and Nuneaton); 45. Mold and Denbigh Junction; 46. Monmouthshire Railway and Canal (New Lines, &c.) (Purchase, &c.); 47. Much Wenlock, &c.); 48. Nantile; 49. Nantwich and Market Drayton; 50. Newcastle-upon-Tyne, Derwent, and Werdale; 51. North British and Peebles; 52. North Eastern and Newcastle-upon-Tyne and Carlisle Amalgamation; 53. North Eastern (Blaydon to Conside) (Castleton and Grosmont Branch, &c.) (Extension to Otley, &c.); 54. North London (Branch to the City) (Widening); 55. North Somerset; 56. Oldham, Ashton under-Lyne, &c.; 57. Oswestry and Newtown (Branches, &c.); 58. Oswestry, Ellesmere, and Whitchurch; 59. Portadown, Dungannon, and Omagh Junction, Rathkeale and Newcastle Junction; 60. Rhymney (Additional Capital) (New Lines, &c.,) (Lease, &c.); 61. Ross and Monmouth; 62. Sherborne; 63. Shirley; 64. Shrewsbury and Welchpool; 65. Shrewsbury, Oswestry, and Ellesmere; 66. Sittingbourne and Sheerness; 67. Sneyd's Branch; 68. Somerset Central; 69. Southampton and Netley; 70. South Eastern (Capital, &c.) (Folkestone Harbour, etc.); 71. South Wales Mineral; 72. Stockton & Darlington (New Railway at Marske and Skelton, etc.); Stockton and Darlington, South Durham and Lancashire Union, etc. Amalgamation; 73. Stourbridge (Extension to Smethwick); 74. Strathspey; 75. Swansea and Neath; 76. Swansea Harbour Trust; 77. Swansea Vale; 78. Vale of Clwyd; 79. Walton and Edgehill Junction; 80. Ware, Hadham, and Buntingford; 81. Waveney Valley; 82. West Midland (New Line, etc.); 83. Whitehaven, Cleator, and Egremont; 84. Witney; 85. Worcester, Bromyard, and Leominster; 86. Workington Tidal Basin and Railway;—Board of Trade Reports.
49. Bill;—Local Government.
Tariffs (Foreign Countries);—Return.

SESSION, 1860.

383. (A IX). Poor Rates and Pauperism;—Return (A).

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, March 15th*, 1861.]

Dated 2nd January, 1861.

7. D. A. Johnson, Chelsea, Massachusetts, U.S.—An improved method of constructing wooden wheels. (Partly a com.)

Dated 19th January, 1861.

156. W. Clark, 53, Chancery-lane—Imp. in compass protractors. (A com.)

Dated 29th January, 1861.

236. W. Smyth and M. Wasley, Carnarvon—Imp. in the mechanism or apparatus for crushing or breaking up ores, stones, and other hard substances.

Dated 12th February, 1861.

350. S. Frankau, Bishopsgate-street Within—An improved cigar or pipe rack, which is also applicable for other purposes.
358. W. Maltby, De Crespigny-park, Camberwell—Imp. in the process of manufacturing a glutinous or viscous substances to be used in dressing textile fabrics, and for other such like processes, or in brewing and distilling, and also in the apparatus to be used for the same and similar purposes.

Dated 13th February, 1861.

374. A. Ripley, 42, Bridge-street, Blackfriars, and W. H. Stevenson, Duke-street, Adelphi—Imp. in the method of manufacturing, and in the mode of constructing and forming pistons and piston-rods.

Dated 14th February, 1861.

376. T. Cobley, Meerbolz, Germany—Imp. in the manufacture of white lead, zinc white, and glazing or potters lead.

Dated 21st February, 1861.

426. F. D. Blyth, 113, Fenchurch-street, and J. Adair, Crane-court, Fleet street—Imp. in machinery for forging nails and other articles. (A com.)
428. J. Dutilleul, 333, Rue St. Martin, Paris—An improved alarm whistle applicable to steam boilers, and indicating the level of the water therein.
434. J. J. Watts and S. Harton, 61, Shoe-lane—Imp. in the manufacture of music plates.

Dated 22nd February, 1861.

450. W. Walker, Liverpool—Imp. in rocket guns and rocket harpoons, and appendages to be used therewith. (A com.)

Dated 25th February, 1861.

487. J. Young, Limefield, Edinburgh—Imp. in heating apparatus.

Dated 26th February, 1861.

496. J. H. Bartholf, King-street, Holborn—An improved construction of rocking horse. (Partly a com.)

Dated 27th February, 1861.

500. W. Whalley, Manchester—Certain imp. in machinery for carding cotton and other fibrous substances.
502. H. J. F. H. Foveaux, Strand—Imp. in specula, and in plugs used in connection therewith.
506. J. Taylor, jun., Roupell-park, Streatham, Surrey—Imp in the construction of roofs for buildings, and in the manufacture of tiles suitable for use for this and other purposes.
508. M. Henry, 84, Fleet-street—Imp. in photography. (A com.)

Dated 28th February, 1861.

511. E. Brasier, Victoria-road, Deptford—Imp. in machinery for treating flax, hemp, New Zealand flax, Spanish or China grass, and other vegetable fibres.
513. W. J. Hay, Southsea, Hants—An improved glue or composition suitable for covering the caulking of ships and other like purposes, for uniting wood and other substances, for filling up seams, and for use as a waterproof glue or composition generally.

514. R. Laing, Ince, near Wigan, Lancashire—Imp. in the treatment of certain ores containing metals, and in obtaining products therefrom.
515. R. Whittam, Accrington, Lancashire—Improved modes of heating the feed water of steam boilers.
516. J. Wilson, Manningham, near Bradford—Imp. in means or apparatus employed in sawing wood.
517. T. Newton, Long acre—Imp. in the accoutrements of horse soldiers' and other saddles.
518. C. Beslay, Rue Menilmontant, Paris—Imp. in the manufacture and renovation of woven fabrics.
519. R. Thompson, New Charlton, Kent—Improved machinery for cutting or sawing wood, stone, or any material capable of being cut or sawn by a rapid reciprocating motion of the cutting or sawing blades.
520. W. Rose and T. Crowder, Wapping—Imp. in apparatus employed for raising and supporting ships and vessels.

Dated 1st March, 1861.

521. W. Galloway and J. Galloway, Manchester—Imp. in moulding wheels and other metal articles.
522. J. W. Mott, Lea Bridge-road, Clapton—Imp. in purses, bags, reticules, pocket books, dressing cases, and other similar portable receptacles.
525. E. T. Hughes, 123, Chancery-lane—Imp. in time pieces. (A com.)
526. G. Smith and J. Carrick, Glasgow—Imp. in commodes or closets, and in bathing, washing, and other sanatory apparatus.
527. R. Howorth, Blackburn—Certain imp. in the manufacture of healds for weaving, and in the machinery or apparatus connected therewith.
528. L. L. Sovereign, 302, Strand—An improved agricultural implement for cultivating land and for sowing seed. (Partly a com.)
529. M. Henry, 84, Fleet-street—Imp. in distilling and rectifying, and in apparatus employed therein. (A com.)
530. E. Birch, 43, Parliament-street, and H. D. Mertens, Margate—Imp. in the permanent way of railways.

Dated 2nd March, 1861.

531. J. Ellis, J. Stringer, and J. Bradock, Droylsden, Lancashire—Certain imp. in apparatus for lubricating the piston rods, valve rods, pistons, and valves of steam engines, and other rods or straps to which a to-and-fro motion is given.
532. A. K. Irvine, Glasgow—Imp. in apparatus for stamping or marking letters or similar articles.
533. R. Griffiths, 69, Mornington-road—Imp. in the arrangements and construction of armour or iron clad steam or other ships.
535. W. Hendry, 220, Thistle-street, Hutchesontown, Glasgow—Imp. in the building of boilers and boiler flues for the consumption of smoke.
536. E. J. Hughes, Manchester—Certain imp. in knitting machines. (A com.)
537. C. Stevens, 31, Charing-cross—An ointment for the cure of sores. (A com.)
539. G. G. Sanderson, Park Gate Iron Works, near Rotherham—Imp. in furnaces used in the manufacture of armour plates for ships and other structures.
540. J. B. Chaussenot, 4, South-street, Finsbury—An improved apparatus for drawing off smoke and gases.
541. S. Botturi, Islington—Imp. in apparatus for weaving.
542. W. E. Newton, 66, Chancery-lane—Improved machinery for folding paper. (A com.)

Dated 4th March, 1861.

543. E. Sabel, Moorgate-street, London—Improved apparatus to be used in the manufacture of paper, applicable also to controlling the motion of travelling webs and fabrics. (A com.)
545. J. James, Princes-street, Leicester square—An improved instrument for sharpening slate-pencils, black-lead pencils, lead pencils, crayons, and such like articles.
547. S. A. Emery, Arundel-street—Imp. in portable apparatus for transporting locomotive engines and trains from one line of rails to another.
548. R. Murphy, Crumlin-road, Belfast—Imp. in looms for weaving.
549. H. Hirsch, Bridge-road, Lambeth—Imp. in insulating and covering the conducting wires used for telegraphic purposes.
550. G. Wilson, jun., Sheffield—An improved construction of railway buffer.
551. A. V. Newton, 66, Chancery-lane—An improved construction of hook for hook-and-eye fastenings. (A com.)
552. W. E. Newton, 66, Chancery-lane—Imp. in machinery for making bullets. (A com.)
553. W. Kay, Bolton-le-Moors, and I. Kay, Lever Bridge, near Bolton-le-Moors, Lancashire—Imp. in machinery for doubling and double twisting yarn.

Dated 5th March, 1861.

555. T. Scott, Newcastle, Down, Ireland—Imp. in the construction of roadways and tramways.
556. E. Whittaker and J. Clare, Hurst, Lancashire—Imp. in machinery or apparatus for preparing cotton or other fibrous materials to be spun.
557. W. H. Haseler, 42, Vyse-street, Birmingham—Imp. in joints or hinges for jewellery and other articles having or admitting of metal joints or hinges, also for improvements in the manner or means of suspending such articles by or with such joints or hinges.
558. J. M. Carter, Somerset-house, Monmouth—Imp. in boots or other coverings for the feet.
559. G. H. Birkbeck, 34, Southampton-buildings, Chancery-lane—Imp. in pistons for pumps, steam engines, or other purposes. (A com.)
560. R. Brearley, jun., Batley, Yorkshire—Imp. in treating woollen union and cloths for surface finish.
561. E. Alcan, Coleman-street-buildings—A method of simultaneously marking and piercing or perforating plates of metal, cardboard, paper, and other material employed in looms for weaving figured fabrics. (A com.)
562. C. Hanson, Haymarket—An improved method of igniting or firing gunpowder, gun cotton, and other like explosive compounds in large and small fire arms and ordnance, applicable also to the firing of explosive compounds generally.
563. A. V. Newton, 66, Chancery-lane—Improved machinery for forging horse-shoe nails, spikes, and other like articles. (A com.)
563. W. E. Newton, 66, Chancery-lane—An improved fastening for buttons, studs, breast pins, brooches, and other articles. (A com.)
566. A. G. Corbett, Glasgow—Imp. in constructing and draining floors, suitable for stables and other places.
567. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in apparatus for administering medicated and voltaic baths. (A com.)

Dated 6th March, 1861.

568. Capt. G. B. V. Arbuckle, Charlton, Kent, and T. Scott, Bedford street, Middlesex—An imp. in the locks of fire-arms.
570. J. Statham, Salford, and W. Statham, Openshaw, Lancashire—Certain imp. in machinery or apparatus for mowing and reaping.
572. G. Eskholme, Rotherham—Imp. in apparatus for regulating the supply of water to water closets, and for other purposes where an occasional or intermittent supply is required.

PATENTS SEALED.

[*From Gazette, March 15th*, 1861.]

March 15th.

2264. H. Stead and H. Gledhill.
2266. E. J. Hughes.
2270. D. Miller.
2272. R. Reece.
2273. R. J. Cole.
2277. R. J. Cole.
2285. A. W. Williamson and L. Perkins.
2287. T. Briggs.
2289. J. H. Taylor.
2291. R. A. Brooman.
2292. J. Cash, and J. Cash, jun.
2295. T. Westhorp.
2296. T. Richardson and M. Prentice.
2297. J. R. Morley.
2300. D. Mubray.
2301. C. B. Rogers.
2302. A. A. Trinquier.
2312. J. Tomlinson.
2316. J. H. Tuck.
2388. C. Mather.
2462. C. Wheatstone.
2751. J. Rollinson and W. Rollinson.
2887. T. Benton.
2978. J. H. Johnson.
3039. A. Verwey.
3075. J. Jackson.
3152. A. V. Newton.
3192. H. Chamberlain.
86. R. Smellie.
87. M. A. Muir and J. McIlwham.
93. J. Gibbs.

[*From Gazette, March 19th*, 1861.]

March 19th.

2315. J. J. Rowley.
2338. F. W. Daehne.
2340. J. McCrossan.
2362. H. Offergeld.
2364. T. Robinson.
2397. J. W. Greaves.
2519. W. E. Newton.
3071. J. Chubb and E. Hunter.
3076. J. P. Baragwanath.
3155. C. H. Adames and C. Whitehouse.
107. J. H. Johnson.
127. J. Batley.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, March 15th*, 1861.]

March 12th.

548. W. Ward.

March 13th.

518. J. C. Martin.
561. A. A. Croll.

[*From Gazette, March 19th*, 1861.]

March 14th.

532. D. Gallafent.
538. W. S. Clark.
560. A. V. Newton.

March 13th.

578. L. Cowell.
587. W. E. Newton.
631. F. Haeck.
651. B. Burrows.
653. J. Welch.

March 16th.

564. H. Brocklebank.
569. T. C. Medwin.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, March 15th*, 1861.]

March 13th.

641. G. H. Barth.

[*From Gazette, March 19th*, 1861.]

March 14th.

658. C. A. B. Chenot.

March 16th.

646. J. Hick.

Journal of the Society of Arts.

FRIDAY, MARCH 29, 1861.

INTERNATIONAL EXHIBITION OF 1862.—GUARANTEE DEED.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others who take an interest in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £345,750, have already been attached to the Deed.

GUARANTEE FUND FOR THE EXHIBITION OF 1862.

The following additions have been made since the last announcement in the *Journal* for March 22 :—

*** *The names marked with an asterisk are those of Members of the Society of Arts.*

NAME.	Amount.	Representing the Objects of the Society—Arts, Manufactures, and Commerce.
George Brooke, (Starkey Bros.) Huddersfield	£1,000	Manufactures.
John Fligg Brigg, (J. F. Brigg and Co.) Huddersfield	150	Manufactures.
Wright Mellor, Huddersfield	250	Manufactures.
William Keighley, Huddersfield	250	Manufactures.
Joseph Beaumont, Jun., Huddersfield	250	Commerce.
John Beaumont, Dalton, Huddersfield	500	Commerce.
Walter Dunlop, Bradford	200	Manufactures.
George Birch, Mayor of Lichfield	100	Arts.
Evan Leigh and Son, Miles Platting, Manchester	200	Manufactures.
Leon Solomon, Dawlish, Devon., and 69, Grosvenor-street, W.	1,000	Arts.
Thomas Callow and Son, 8, Park-lane, W.	100	Commerce.
William Thomas Treggon (Treggon and Co.), 22, Jewin-street, E.C. ...	100	Manufactures.
*Charles Brooke, F.R.S., 16, Fitzroy-square, W.	100	Arts.
Jeffery Ludlam, 174, Piccadilly, W.	300	Commerce.
William Simpson Potter, 1, Adam-street, Adelphi, W.C.	500	Arts.
*William Field, 224, Oxford-street, W.	200	Arts.
Westley Richards, High-street, Birmingham	200	Manufactures.
J. Dent Goodman, Minories, Birmingham	100	Manufactures.
Charles Thomas Shaw, 66, Great Hampton-street, Birmingham	100	Manufactures.
Charles Osborne, Whittall-street, Birmingham	100	Manufactures.
Frederick Johnson, 12, North-street, Westminster, S.W.	500	Commerce.
Henry Barrett, (R. Barrett and Sons,) Beech-street, Barbican, E.C. ...	200	Manufactures.
George Smith, (William Smith, Son and Co.) Leeds	500	Manufactures.
John Wilkinson, Jun. (John Wilkinson, Son and Co.) Hunslet, Leeds ...	500	Manufactures.
Richard Nichols, Joppa, Leeds	100	Commerce.
Charles Brook, Jun., (Jonas Brook and Bros.) Meltham Mills, near Huddersfield ...	1,000	Manufactures.
*James Kitson, Mayor of Leeds	500	Commerce.
Arthur Kinder, 18, Great George-street, Westminster	100	Arts.
George Thomas Saul, Bon Lodge, Bow, E.	100	Arts.
James Dickinson, (Wm. Dickinson and Sons,) Blackburn	500	Manufactures.
William Buxton, Mayor of Stafford	100	Arts.
Thomas Dickins, Edgemoor House, Higher Broughton, Manchester ...	200	Manufactures.
Henry Mc Connel, Cressbrook, Bakewell (*via* Sheffield)	1,000	Manufactures.
David Faulkner, 3, Brydges-street, Strand, W.C.	100	Arts.
Nathaniel C. Tuely, 8, Spencer Villas, Southfields, Wandsworth, S. ...	100	Arts.
William Quilter, 3, Moorgate-street, E.C.	100	Commerce.
William Henry P. Goore, Camden Villa, Moscow-road, Palace-gardens ...	100	Arts.
Francis Rogers, 2, Arundel-place, Barnsbury-park, N.	100	Arts.
Christopher Other, (Other and Robinson,) Wensleydale, Bedale, Yorkshire ...	500	Commerce.
H. C. Rothery, 94, Gloucester-terrace, Hyde-park, N.W.	100	Arts.
*Thomas Dunn, Richmond-hill, Sheffield	250	Manufactures.
John Brown, (John Brown and Co.,) Shirl-hill, Sheffield	250	Manufactures.
Frederick Thorpe Mappin, (Thomas Turton and Sons,) Sheaf-works, Sheffield ...	250	Manufactures.
Joseph Charles Mappin, (Mappin Bros.) Baker's-hill, Sheffield	200	Manufactures.
Walter May, (Walter May and Co.,) Birmingham	100	Manufactures.
W. H. M. Blews, (William Blews and Son,) Birmingham	100	Manufactures.
T. B. Wright, Birmingham	100	Manufactures.
*William Smith, C.E., 18, Salisbury-street, Adelphi, W.C.	150	Arts.

NAME.	AMOUNT.	REPRESENTING THE OBJECTS OF THE SOCIETY—ARTS, MANUFACTURES, AND COMMERCE.
Robert Henty, 40, Brunswick-square, Brighton	500	Arts.
Thomas Colling, Jun., M.P., Knaresborough	200	Arts.
*Peter Dickson, 28, Upper Brook-street, W.	1,000	Commerce.
Frederick Besley, Nicholson's Wharf, E.C.	200	Commerce.
Edwin Davis, Hull	300	Commerce.
H. G. Haward, Haverstock-hill	100	Arts.
Henry Vickers, Mayor of Sheffield	£100	Manufactures.
Michael Hunter, Jun., Master Cutler of Sheffield	100	Manufactures.
Henry Stephenson, (Stephenson, Blake and Co.,) Allin-street, Sheffield ...	100	Manufactures.
Robert Newbold, (Joseph Rodgers and Sons,) Norfolk-street, Sheffield ...	250	Manufactures.
Samuel Gardner, (John Kenyon and Co.,) Sheffield	200	Manufactures.
Richard Martin, (Martin, Hall and Co.,)	200	Manufactures.
John Fearnley, Clareville, Southport	100	Arts.
*Herbert Harris Cannan, Knight's-hill House, Norwood, S.	100	Commerce.
Gundry and Sons, 1, Soho-square, W.	100	Commerce.
Frederick Davis, 100, New Bond-street, W.	500	Arts.

BY ORDER,

P. LE NEVE FOSTER, *Secretary.*

INTERNATIONAL EXHIBITION OF 1862.

The following is the classification intended to be adopted by her Majesty's Commissioners for the Great Exhibition of 1862 :—

SECTION I.—RAW MATERIALS.

Mining, Quarrying, Metallurgy, and Mineral Products; Chemical Substances and Products, and Pharmaceutical Processes; Substances used for Food, including Wines; Animal and Vegetable Substances used in Manufactures.

SECTION II.—MACHINERY AND ENGINEERING.

Railway Plant, including Locomotive Engines and Carriages; Carriages not connected with rail or tram roads, Manufacturing Machines and Tools; Machinery in general, as applied to industry; Agricultural and Horticultural Machines and Implements, Civil Engineering, Architectural and Building Contrivances; Military Engineering, Armour, and Accoutrements, Ordnance and Small Arms; Naval Architecture and Ships' Tackle; Philosophical Instruments, and Processes depending on their use; Photography, and Photographic Apparatus; Horological Instruments; Musical Instruments; Surgical Instruments and Appliances.

SECTION III.—MANUFACTURES.

Cotton; Flax and Hemp; Silk and Velvet; Woollen and Worsted, including Mixed Fabrics generally, Carpets; Woven, Spun, Felted, and Lace Fabrics, when shown as specimens of Printing or Dyeing; Tapestry, Lace, and Embroidery; Skins, Furs, Feathers, and Hair; Leather, including Saddlery and Harness; Articles of Clothing; Paper, Stationery, Printing, and Bookbinding; Educational Works and Appliances; Furniture and Upholstery, including Paperhangings and Papier Maché; Iron and General Hardware, Steel, and Cutlery; Works in Precious Metals and their imitations; Jewelry; Glass; Pottery; Manufactures not included in previous Classes.

SECTION IV.—FINE ARTS (MODERN).

Architecture; Paintings in Oil and Water Colours and Drawings; Sculpture, Models, Die-sinking, and Intaglios: Etchings and Engravings.

In the Exhibition of 1851 there were only 35 Classes. In the proposed one, therefore, there are five additional.

INTERNATION EXHIBITION OF 1862.

The following communicationhas been received by the Secretary of the Society of Arts:—

New York Sta'e Agricultural Hall.

MY DEAR SIR,—I forward you the accompanying resolution, passed at our Annual Meeting. The most lively interest is manifested in the Exhibition, and I trust New York will be well represented. The probability is, that all the Northern and Western States will be fully represented.

Hoping to receive, at an early day, the programme of the Exhibition,

I am, very respectfully yours,

B. P. JOHNSON, Secretary.

P. Le Neve Foster, Esq., Secretary of the Society of Arts.

NEW YORK STATE AGRICULTURAL SOCIETY.

At the Annual Meeting of the Society, at the Capitol, Albany, New York, February 13th, 1861, the following resolutions were unanimously adopted:—

"On motion of Mr. Johnson, Resolved—'That the New York State Agricultural Society have received, with much satisfaction, notice from the Society of Arts, London, of the proposed Exhibition, in honour of the industry of all nations, to be held in London in 1862.

"That our Agriculturists, Manufacturers, Mechanics,

and Inventors, be encouraged to prepare for the Exhibition.

"That the Society will, as far as in its power, extend facilities to those who are desirous of competing at that Exhibition.'

"That the Corresponding Secretary cause a copy of the above to be furnished, under the Great Seal of the Society, to the persons having charge of the contemplated Exhibition in London.'"

In testimony whereof I have hereunto subscribed my name as Secretary, and affixed the seal of the Society, this 13th day of February, 1861.

BENJ. P. JOHNSON,
Corresponding Secretary.

To the Society of Arts, St. John-street, Adelphi, London.

THIRTEENTH ANNUAL EXHIBITION OF INVENTIONS.

The Exhibition will be opened on Monday next, the 1st of April, and will remain open every day until further notice, from 10 a.m. to 4 p.m., and is free to members and their friends. Members by ticket, or by written order, having their signature, may admit any number of persons. Members of Institutions in Union with the Society are admitted on showing their cards of membership.

A sheet of tickets is issued with this copy of the *Journal* to every member. Additional tickets may be had on application to the Secretary of the Society.

Home Correspondence.

ELEMENTARY EXAMINATIONS.

Sir,—The formation of a Central Committee for the purpose of still further extending the principle of Local Examinations to the industrial classes, under the sanction of the Society of Arts, is a step which I believe may be more fruitful of beneficial results, than even the system now in operation, and which has already effected so great an amount of good. The chief obstacle to the extension of education amongst the great majority of our working population, is the early age at which children are taken from school in order to earn their subsistence by their labour, and this is still further promoted by the many facilities which are given to youthful employment. In their case the day-schools have effected comparatively little. Too short time has been occupied in their instruction; they have barely acquired the rudiments of learning, and in very few instances have even a desire to obtain further information; so that while evening-schools and the classes of Mechanics' Institutes offer the means of continuing their imperfect education, the youths who by their labour have to a degree become independent of parental control, do nothing for themselves, soon lose the little they have learned, and lapse into ignorance.

The certificates and prizes offered by the Society of Arts are valuable inducements to the self-improvement of our young men, who, as members of Mechanics' Institutes, devote their attention to specific branches of study, but they afford no stimulus to the youths who can barely read; they are apparently too far beyond their reach, and fail to excite emulation or desire for their attainment. The great want and one which is severely felt, especially in the manufacturing districts, is a system of examinations of a lower grade, and certificates which, while they merely declared the proficiency of the holders in such humble acquirements as reading, writing, and arithmetic, might come within the reach of those whose ambition must be as yet confined to their attainment.

If the youths who have left day-schools to be engaged in factories, iron works, collieries, and other employments, would be stimulated to seek their own improvement in evening schools and the elementary classes of Mechanics' Institutes by the offer of certificates of such prizes, the way would be prepared for many additional candidates for the certificates of the *Society of Arts*. They would not only be encouraged to continue their education, which now they are tempted to neglect, but they would become familiarised with competition and examination, and induced to continue the mental cultivation of which they would have exprienced some of the good effects.

Something has already been done by Local Boards, and particularly by Mechanics' Institutes, but there are many difficulties to overcome, and beyond this the certificates of a small locality, however ably the examination may have been conducted cannot be supposed to have the same weight, or to be so highly prized, as those which may emanate fiom a central body with the *prestige* of a time-honoured name. It is for this reason that great service may be rendered by the Central Committee, if they organise a system of purely elementary examinations to be worked by the several Local Boards already formed and which may be formed throughout the country.

In the first place great assistance might be given by the preparation of the necessary papers. This would not only secure a uniformity of standard, as far as practicable, but by the papers being supplied to each Local Board at prime cost, a considerable saving in expense would be effected. A number, showing the relative value of the answer to each question, might also be supplied to the Local Boards, so as to guide the examiners in their awards. It would of course be impracticable for the worked papers to be examined by the central body, it must therefore be left to the fidelity of each Local Board, who, with a guide befoie them in the papers would at least approximate to uniformity.

The next point is the award of certificates, prizes of course depending upon local resources. These might be supplied by the central body at prime cost, thereby reducing the expense, but as they would be awarded on the responsibility of each Local Board, they should bear the name of such locality, and be signed by the respective officers—say the Chairman and Secretary. Much additional value, however, would be given to them if each certificate bore on it the words "Under the Sanction of the Society of Arts." Indeed the chief advantage to be expected from the movement is the uniformity of standard from having a uniform set of examination papers, the value of the certificates as a stimulus to education, by the connection with the Society of Arts, and the economy of expense to Local Boards by having both papers and certificates supplied to them at cost price.—I am, &c.,

BARNETT BLAKE.

Leeds, Feb. 18, 1861.

Proceedings of Institutions.

Metropolitan Evening Classes, Sussex Hall.—It is understood that there is every prospect of the Metropolitan Evening Classes (established at Crosby Hall, but now carried on at Sussex Hall, Leadenhall-street), being placed on a more permanent footing for the future. A deputation, consisting of the following gentlemen—Mr. Harry Chester; the Revs. F. D. Maurice, Charles Mackenzie, Richard Whittington, and others, together with some of the members of the Institution, attended at London House to meet the Bishop of London, on Wednesday the 20th instant (March), to lay before him a report upon the evening classes, when his lordship expressed himself desirous for the continuance of the evening

classes, as they had been already eminently useful, and met the wants of a class not supplied by King's College or any other institution. At the request of his lordship, the honorary secretaries consented to hold office until a scheme should be arranged to convert the present classes into an endowed college or a collegiate institution, which shall occupy an intermediate position be ween the evening classes at King's College and the classes of an ordinary working man's college. It is hoped that the friends of education will now testify their approval of the exertions that are being made for the young men of London by assisting the committee in their new undertaking.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Royal Inst., 2. General Monthly Meeting.
Entomological, 8.
Medical, 8½. Clinical Discussion.
Tues. ...Civil Engineers. No meeting.
Pathological, 8.
Photographic, 8.
Wed. ...Society of Arts, 8. Dr. C. W. Eddy, "On Economic Contrivances and Labour Saving Machines used in the United States of America."
Microscopical, 8.
Pharmaceutical, 8.
Ethnological, 8½.
Thurs...Linnæan, 8. 1. Col. Munro, "On the Identification of the Grasses of *Linnæan Herbarium*." 2. Mr. M. T. Masters, "On an unusual mode of Germination in the Mango."
Chemical, 8. 1. Dr. Marcet, "On the Solubility of Oxide of Zinc in the Gastric Juice.' 2. Dr. Guthrie, "On some Derivatives of the Olefines."
Photographic. Soirée at King's College.
Fri. ......Archæological Inst., 4.
Sat. ...Asiatic, 3.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, March* 22*nd*, 1861.]

Dated 14*th January*, 1861.

99. C. Brush, Enfield, Meath, Ireland—Imp. in fog signals for railways.

Dated 13*th February*, 1861.

370. J. S. Blake, Portsea, Hants, and G. C. Lingham, and J. Nicklin, Birmingham—Certain imp. in the means of or apparatus for holding or filing receipts, invoices, and other papers, or tickets, and which said means are also applicable for holding other articles, such as fancy or other wares required to be held.

Dated 22*nd February*, 1861.

449. J. Reeves, New York—Imp. in the electro-magnetic engines for obtaining and applying motive power.

Dated 23*rd February*, 1861.

464. A. Duriez and S. Emsley, Roubaix, France—Imp. in machinery or apparatus for preparing fibrous materials to be combed or spun.

Dated 25*th February*, 1861.

475. C. Sallows, Maidstone, Kent—Improving the action or motion of the Kent brush drill at present used in agriculture.

Dated 28*th February*, 1861.

512. J. Bayley and J. Quarmby, Staleybridge, and E. Burns, Manchester—Certain imp. in "cop tubes," and in machinery or apparatus employed in the manufacture thereof.

Dated 1*st March*, 1861.

524. H. R. de St. Martin, 44, Frith-street, Soho—An improved apparatus for indicating the names of railway stations to passengers.

Dated 2*nd March*, 1861.

538. F. Wright, Graham street, Leicester—Imp. in circular knitting frames or machines.

Dated 4*th March*, 1861.

546. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in planes. (A com.)

Dated 6*th March*, 1861.

569. H. A. Silver and H. Griffin, Silvertown, Essex—Imp. in the manufacture of insulators and other articles in India rubber which are required to retain a shape once given to them, in curing hard rubber, ebonite, or vulcanite goods, in moulding India-rubber articles in the construction of cellular fabrics in india-rubber, and in forming articles partly of soft and partly of hard rubber, or ebonite, or vulcanite, and in varnishes for india-rubber goods.

571. A. D. Martin and P. V. du Trembley, Rouen, France—Imp. in apparatus for communicating sound signals.
573. J. Hodgson, Back-lane, Newton Moor, Hyde, near Manchester—Imp. in the pistons of steam engines, and in the buckets and plungers for pumps.

Dated 7*th March*, 1861.

574. W. Wild, Bury, Lancashire—Certain imp. in machinery or apparatus to be employed in the preparation of cotton and other fibrous materials for spinning, called slubbing frames and roving frames.
575. W. E. Wiley, 34, Great Hampton-street, Birmingham—Imp. or imps. in ornamenting surfaces.
576. A. G. Brade, Paris—Imp. in preserving animal or vegetable matters. (Partly a com.)
577. W. Pidding, Borough-road, Southwark—Imp. in preserving the aroma and other properties of coffee and cocoa from the effects of the atmosphere.
579. T. W. Evans, M.D., 15, Rue de la Paix, Paris—Imp. in telegraphic cables.
580. N. A. Pouard, 16, Rue de L'Orillon, Paris—Imp. in breaks for railway rolling stock.
581. W. E. Newton, 66, Chancery-lane—Imp. in the manufacture of yarns or threads. (A com.)
592. J. Edwards, Horace-terrace, Shepherdess-walk, Middlesex—Imp. in the construction of carriage wheels.
583. G. Hollands, Rochester—Imp. in the mode of, and apparatus used in, the process of fermentation.
584. W. Clark, 53, Chancery-lane—Imp. in warping, dressing, and finishing threads, and in apparatus for the same. (A com.)

Dated 8*th March*, 1861.

585. B. Britten, Barrington-road, Brixton—Imp. in projectiles for rifled ordnance.
586. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in cravats or coverings for the throat and chest, and in the fastenings for the same, which fastenings are applicable to various other parts of dress. (A com.)
587. R. Leake, jun., and W. Shields, Manchester—Imp. in machinery for engraving, stamping, or embossing cylinders and other surfaces used in printing and embossing fabrics and other materials.
589. P. Doury, Rethel, Ardennes, France—Imp. in rifled or smooth barrelled arms, discharging projectiles forcibly propelled or not, and loaded by the breech.

Dated 9*th March*, 1861.

590. T. W. Davenport and S. Cole, Moseley, King's Norton, Worcestershire—Imp. in the manufacture of holders or handles for pens, pencils, and artists' or painters brushes.
592. H. B. Barlow, Manchester—Imp. in apparatus for preventing the explosion of steam boilers. (A com)
593. J. Jacob, Golden-square—Imp. in the mode of and apparatus for obtaining gas, and the application thereof for domestic, manufacturing, and other purposes. (A com.)
594. M. Meyers, Great Alie-street, Middlesex—Imp. in woven fabrics.
595. W. H. Buckland, Barge-yard, Bucklersbury—Imp. in the manufacture of iron.

PATENTS SEALED.

[*From Gazette, March* 22*nd*, 1861.]

March 22*nd*.
2324. J. Vavasseur.
2325. C. Kind.
2336. C. Burn.
2337. C. Burn.
2416. W. Clegg, T. Wild, and J. Tomlinson.
3164. J. H. Johnson.
143. J. Jobson.
182. W. Clark.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, March* 22*nd*, 1861.]

March 18*th*.
563. P. F. Aerts.
565. G. Scott.
662. J. Horton.
673. T. Silver.
March 19*th*.
588. J. T. Pitman.
597. I. Holden, and E. Hubner.
610. C. F. Quintin.
679. F. A. Gatty.
March 20*th*.
577. D. Harris.

[*From Gazette, March* 26*th*, 1861.]

March 21*st*.
605. W. E. Wiley.
616. M. A. F. Mennons.
620. G. A. Biddell and W. Balk.
633. W. Richards.
875. W. H. F. Talbot.
March 22*nd*.
604. J. Rowbottom.
617. C. N. Kottula.
618. C. N. Kottula.
619. C. N. Kottula.
628. J. Nuttall.
655. W. A. Gilbee.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, March* 22*nd*, 1861.]

March 20*th*.
668. J. Polson.
696. W. Wood.

[*From Gazette, March* 26*th*, 1861.]

March 23*rd*.
689. S. Holman.
702. T. J. Smith and J. Smith.
924. H. B. Barlow.

CATALOGUE

OF THE

THIRTEENTH ANNUAL EXHIBITION OF INVENTIONS.

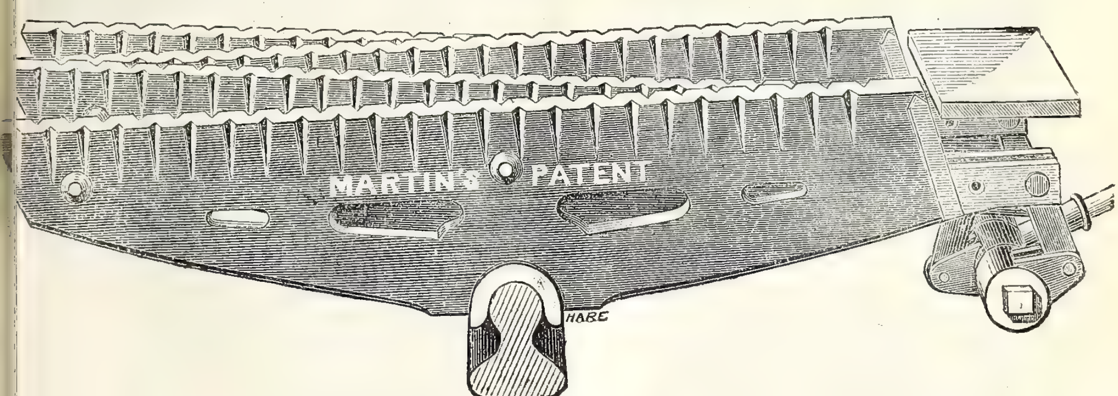
BEING A COLLECTION OF ARTICLES RECENTLY INVENTED, PATENTED, OR REGISTERED, EXHIBITED AT THE SOCIETY OF ARTS, ADELPHI, DURING THE SPRING OF 1861.

N.B.—The Council wish it to be understood that they are not responsible for any of the statements contained in this Catalogue.

ENGINEERING, MINING, RAILWAY MECHANISM, &c.

(*For the remainder of the Articles in this Section, see Drawings.*)

1. Patent Rocking Fire Bars; William Arena Martin, 55, Great Sutton-street, Clerkenwell, E.C.



These fire-bars have but one bearer, on which they rock, and which is situated in the centre or nearer one end, according to their length. Motion is given by link levers, threaded on a suitable-sized square bar, having a bearing at each end under the dead plate. One of the levers has a socket cast on it for the admission of a moveable or fixed handle, which gives motion to the whole series at once. A catch is fitted to the side lever, to retain them in a level position after the rocking movement has been performed. The holes in the bars are for keeping them cool, also for allowing expansion and contraction, and preserving them in a straight line. The grooves at the top edges are for grinding the clinkers and passing them through, thereby keeping the spaces clear for admitting streams of air, the back or bridge ends of the bars being entirely free, allowing currents of air by their free passage to ignite the gases, thus consuming smoke and giving intense heat. The rocking movement entirely breaks up all clinkers, affording unusual facility for keeping fires clean with every variety of fuel and continual use.

2. Specimen of Patent Fuel; Jabez Church, Gas Station, Upper Kennington-lane, S.E.

This fuel is manufactured from the breeze of gas works, mixed with asphalte or coal-tar pitch, slaked lime, and a sufficient quantity of coal tar to render it adhesive. It is then placed in a wrought iron scoop, which is to be put into a retort, such as is commonly used in gas works, and then submitted to the action of heat during five or six hours, when it forms a fuel for locomotive engines, as well as for other purposes requiring the use of coke fuel.

3. Patent Fire Feeder and Smokeless Furnace; William Yates, 7, Mary-street, Bromley, Middlesex, E.

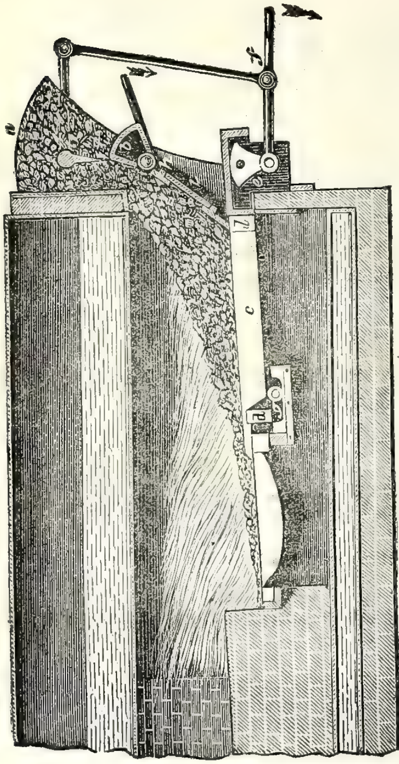


Fig. 1.

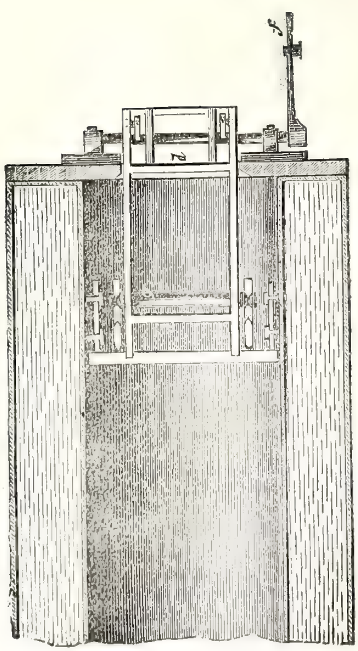


Fig. 2.

In the accompanying engravings Fig. 1 is a sectional elevation, and Fig. 2 a plan of the front part of the furnace. Above the mouth of the furnace is a hopper *a*, with a bottom *b* attached to a tranverse shaft, and which may be moved by hand or otherwise, so as to open a free passage for fuel down into the furnace. Several

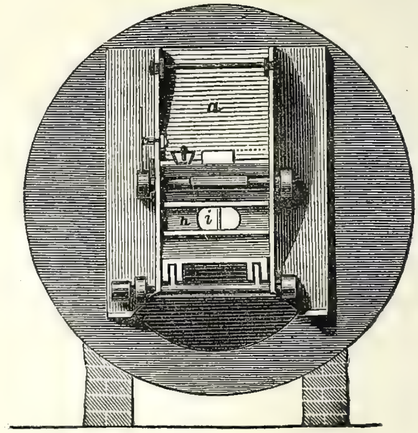


Fig. 3.

of the central firebars of the furnace *c c* are connected together by tranverse bearers or frames *d d*, the outer ends of them (or those nearest the front of the furnace) being supported upon a rocking quadrant *e*, which is furnished with a

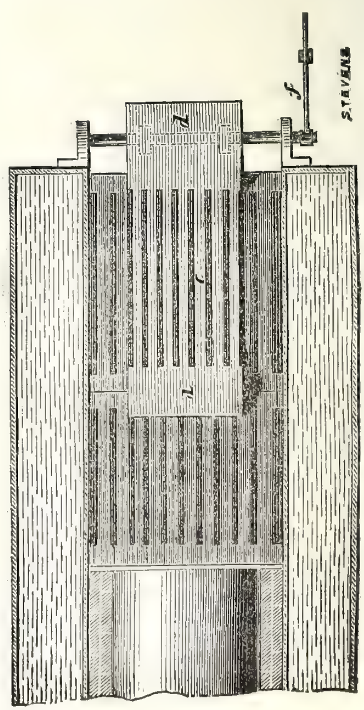


Fig. 4.

lever *f*, and the inner ends upon a roller *g*. Then, by means of a pin attached to the quadrant and

a slot in the front bearer or frame, or by any other suitable means, when the quadrant is turned about its axis in one direction, the fire-bars are drawn out from under the fuel, which is prevented from moving forward with them by the closed door of the furnace *h*, and when the quadrant is turned in the other direction the fuel is carried back into the furnace on the firebars, a fresh supply at the same time falling in behind it from the hopper. The door is kept shut during the ordinary working of the furnace, and is provided with a hole, shut by a slide *i*, through which hole the condition of the furnace may be watched, and the stoker's tools applied if necessary. Fig. 3 shows a plan of the furnace with some of the bars and other parts removed, and Fig. 4 is a front elevation of the furnace.

4. Wright's Improved Patent Moveable Fire Bars; Exhibited by J. Lester Clark, 2, Sambrook-court, Basinghall-street, E.C.

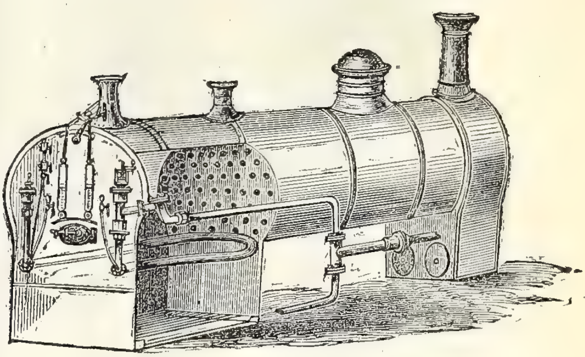
These fire-bars have a peculiar advancing and retiring action, which is produced by a lever in front of the dead plate. The slag that is formed at the extreme back of the furnace is thus brought with every successive action of the bars, and deposited on the dead-plate or mouth of the furnace: this is important, as the removal of slag from the extreme back of furnaces has always been attended with great difficulty and the periodical destruction of the fire, with the attendant evil consequences of a sudden rush of cold air to the boiler, which too often suddenly contracts the plates, and cracks them, or causes old flaws and defects to leak anew.

5. Patent Steam Boiler; J. Redfern, 33, Cumberland-road, Southsea.

This invention is designed for preventing the burning of the tubes of multitubular boilers, and also for presenting a considerably larger area of fire surface than usual, in proportion to the size of the boiler. The tubes are also more accessible for cleaning and repairing, as also the flues and other parts of the boiler. The peculiarity of the invention consists principally in constructing the boiler with a return flue at the sides or through the centre, thus compelling the heat to traverse from back to front of the boiler and then to enter the tubes at the front end of the boiler instead of the back, as usually arranged. By these means burning of the tubes and tube plate is prevented or materially lessened, the durability of the boiler increased and economy in fuel effected. Should it be necessary at any time to take out the tubes, they can be replaced without any new tubes being required, as shown in the drawing, fig. 3. The boiler takes up no more room, and has quite as much tube area, that which is taken from the sides being made up at the top; they can be made with doors either front or back, or with both, as local circumstances may admit, and any number of fire-boxes may be placed in one casing. (See drawing No. 238.)

6. Patent Feed-water Heating Apparatus and Safety Tube for Tubular Steam Generators; S. S. Bateson, 17, Bolton-street, Piccadilly, W.

This invention consists, first, in forcing the feed-water through a tube or feed-coil, placed within the fire-box or furnace, and exposed to the action of the fire before it enters the boiler. Secondly in fitting such tube or feed-coil with an internal tube of smaller diameter in connexion at each end with the water space of the boiler, and perforated with small holes throughout that portion of its length which coincides with the surface of the external tube exposed to the direct action of the fire. Thirdly, in the application of valvular arrangements by which the feed-coil becomes a tubular appendage to or part of the boiler when the feed pump is not in action. Fourthly, in the application of the internal perforated tube to all steam generators composed wholly or partly of water-tubes, by which the tendency of the water therein to assume the spheroidal condition and the consequent burning and destruction of the tubes, are prevented.—(See *Practical Mechanics' Journal*. Dec. 1, 1860, p. 236.)



7. Patent Feed-Water Heater for Marine Steam-Boilers; Francis Davidson, 49, York-terrace, Everton, Liverpool.

This invention consists of mechanical arrangements for heating or raising the temperature of the water forced into or supplied to marine steam boilers, by the utilisation of the heat given off by, or through the "surface blow-off" pipe. The model shows the internal tube as the ordinary "surface blow-off," and the annular passage formed by jacketing it, or surrounding it, with a larger pipe, as the feed-water passage or space.

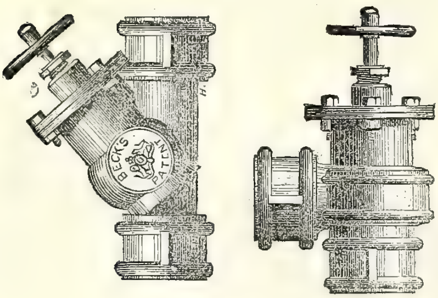
8. Safety-Pipe for Steam-Boilers; Samuel Terrill, Redruth, Cornwall.

This pipe is placed in the boiler, and fastened at the bottom by rivets. Two inches above the furnace, a lead ring is placed, forming part of the pipe. If the water should at any time be low, the lead will melt, and permit the steam to escape through the pipe at the top of the boiler. The lead being placed two inches above the furnace, will be prevented from corroding by any action upon it of sediment in the boiler.

9. Patent Stop-Valve for Hot Water and other Fluids; T. Beck, 10, Isabella-street, Collingwood-street, Blackfriars-road, S.

The peculiarity of these valves consists in the

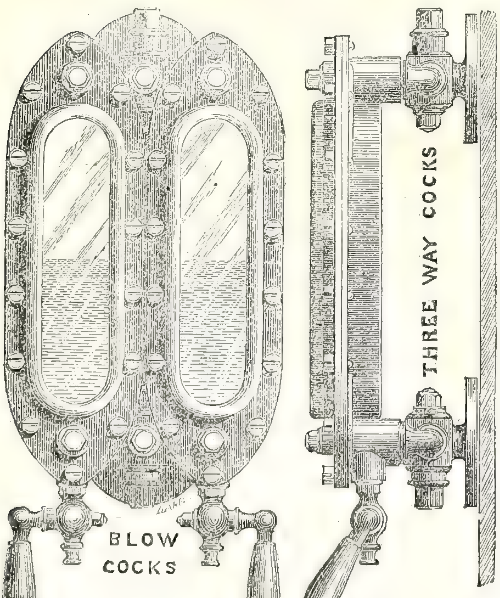
movement of the valve spindle, the screw of which is so arranged as to work in about one-fourth part of a female screw, which may be said to form a rack, thus much diminishing the liability to set fast.



10. Patent Flat Glass Water Gauges for Steam Boilers, &c.; James Chandler, 35, Sutherland-street, Pimlico, S.W.

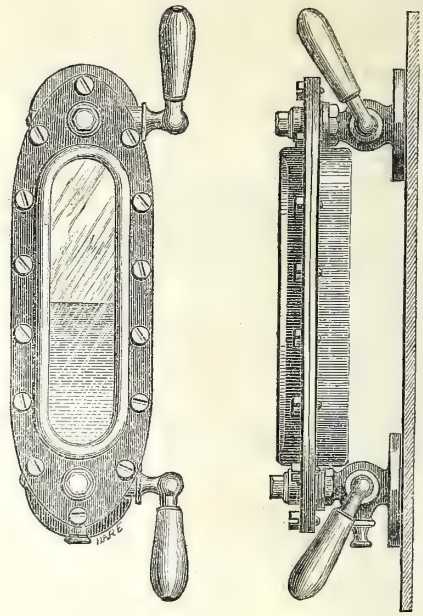
Double and Check Gauge, A.

The object of this gauge is, that the indication of one should check the indication of the other; and should either of them meet with injury the one injured can be shut off during repair and the other used as a duplicate.



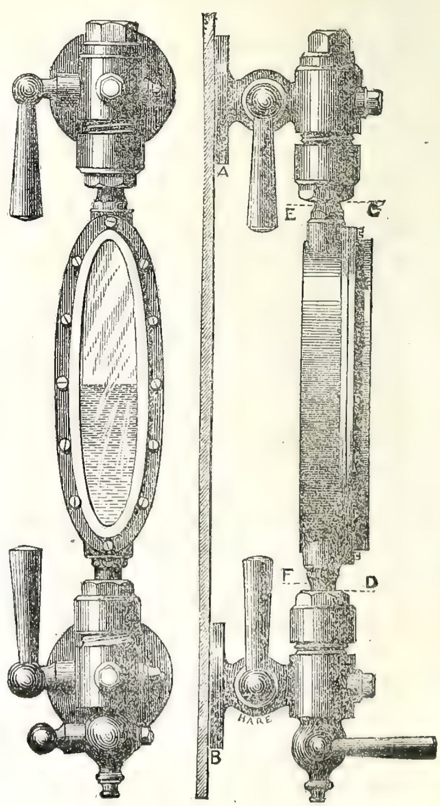
Single Gauge, B.

This gauge is single, but it is on the same principle as the guage *A*.
This gauge is intended as a substitute for the common glass tube for existing glass tube con-



Universal Gauge, C.

nections on old boilers, the object being to avoid the inconvenience of stoppages, &c., as this gauge can be attached to the old cocks as readily as renewing a glass tube.

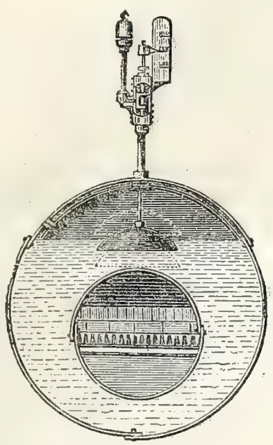


12. Patent Flat Glass Water Gauges; Pullan and Cresswell, Surrey Iron Works, 92, Blackfriars-road, S.

(See drawing, No. 230.)

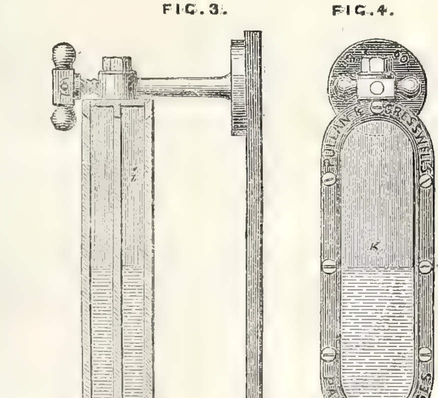
Fig. A, Medwin's patent alarm whistle water gauge. The float is hollow, made of iron, and hung by a hollow rod passing freely up a pipe affixed to the slide and pointer, both of which it moves as the water rises and falls in the boiler, and opens the passage to the whistle, which

Fig. A.



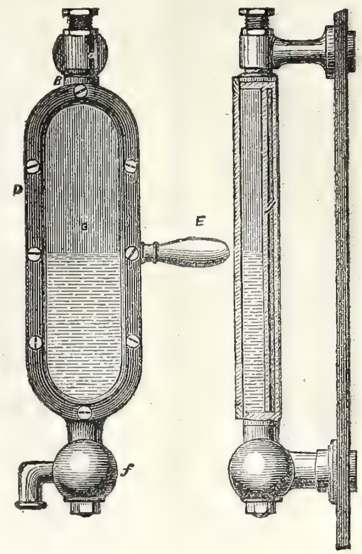
blows loudly until attended to. Figs. 3 and 4 are a front elevation and sectional side view of the patent reflecting flat glass water gauge, with screw valves, top and bottom, for testing and shutting off all communication

FIG. 3. FIG. 4.



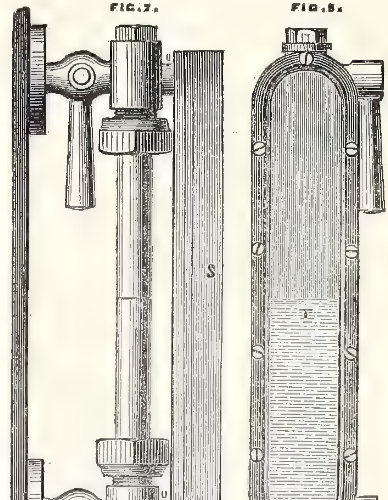
from the boiler. Figs. 1 and 2—Front elevation and sectional side view of the patent water gauge, with a reflector at the back to show the height of the water, also an improved mode of shutting off all communication with the boiler by turning the

FIG. 1. FIG. 2.



gauge by the handle, as shown at the side. Figs. 7 and 8 show one of the patent reflecting flat glass gauges affixed to an ordinary gauge on a boiler, by which a much longer range of water is obtained, and no fresh

FIG. 7. FIG. 8.



holes required in the boiler. Figs. 5 and 6 show an arrangement for several gauges to be placed behind one another, so that, in case of accident

to the front glass, it can be removed by closing one of the valves top and bottom.

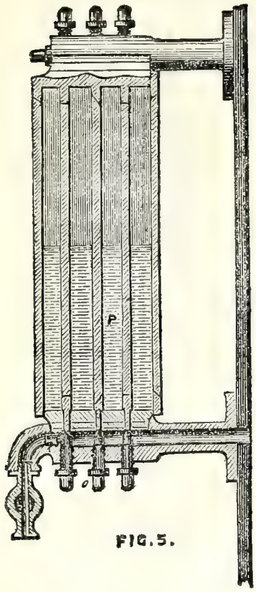


FIG. 5.

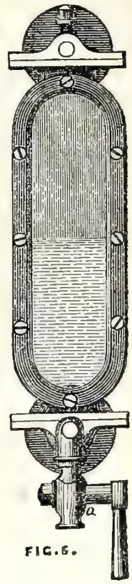
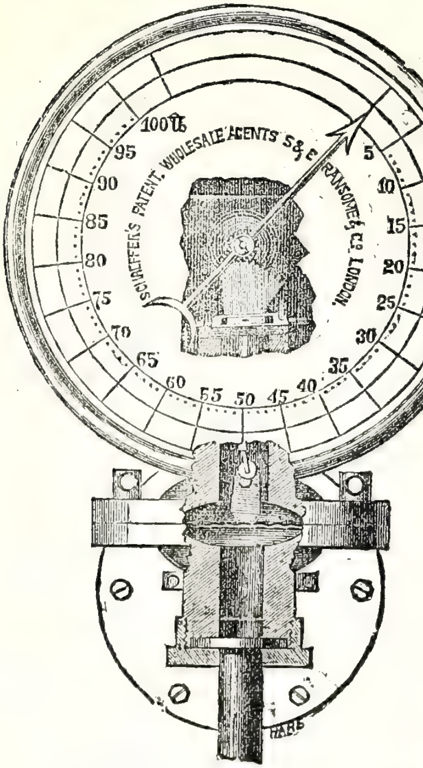


FIG. 6.

13. Schaeffer's Patent Improved Steam and Vacuum Gauge; S. and E. Ransome and Co., 31, Essex-street, Strand, W.C.



The action of this gauge is direct. The steam, brought by a small tube from the boiler or main-pipe, presses on a corrugated metal plate, which is protected from corrosion by a plate of pure silver. The specimen gauge exhibited is a combination of pressure and vacuum upon one dial, thereby obviating the necessity of having two separate gauges.

14. Patent Steam Boiler and Superheating Apparatus; Pullan, Cresswell, and Longstaff.—Exhibited by Pullan and Cresswell, Surrey Iron Works, 92, Blackfriars-road, S.

15. Patent Improved Steam Engine Governor; William Leatham, Brookfield Works, Hunslet-lane, Leeds.

(See Drawing, No. 234.)

16. Patent Water Meter; Manchester Water Meter Company, Tipping-street, Ardwick, Manchester.

17. Sebill's Patent Water, Gas, and other Conduit Pipes.—Exhibited by John Gedge and Son, 11, Wellington-street, Strand, W.C.

These pipes are manufactured (by pressure in a cylinder) from a composition of waste slate, vegetable or mineral pitch or resin, and a small portion of animal or vegetable fibre or bristle. They offer the advantages of cheapness, comparative lightness, and facility of connection with each other, or with other pipes, jointing being effected by bringing the ends of the pipes together and passing a hot instrument over them, when the pipes will cement by running one into the other, or when softened at the joint a portion of the same composition may be used as a solder, as shown by the joint in the pipe No. I. By boring with a hot augur, any description of branch pipe may be at once introduced, or a tap, as shown by the pipe No. 2.

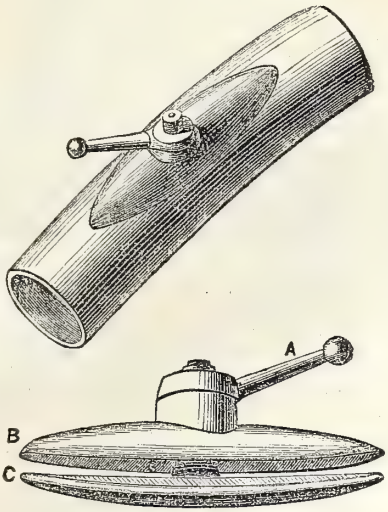
18. Patent Portable Pump, or Fire-Engine; Wm. Roberts, Millwall, Poplar, E.

19. Patent Metallic Clamp for Fire-Engine Hose, Flexible or Compressible Tubing, &c.; Robert Dawbarn, Wisbech, Cambridgeshire.

The object of this clamp is to close rents or fractures in piping. It consists of three separate pieces of metal, indicated by the letters A, B, and C. B and C are two plates fitting accurately upon each other, and to each is given the necessary concavity to suit the curve of the hose or pipe to which it may be applied. From the centre of the lower plate, C, rises perpendicularly a screw, which, passing through the upper plate B, enters a collar tapped to receive it. On turning the bent lever A, which is attached to the collar, the two plates are brought into contact. When the clamp is applied, the lower plate is inserted in the tube beneath the rent or fracture, and a few turns of the lever are sufficient to effectually

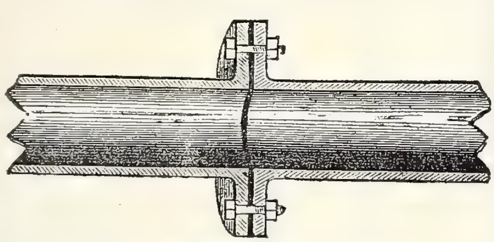
close the leak. The time required for its application, under ordinary circumstances, is less than a minute. In addition to its special utility to fire-engines, it is capable of application to many other purposes, as in manufactories, breweries, ships, and wherever else flexible piping is employed.

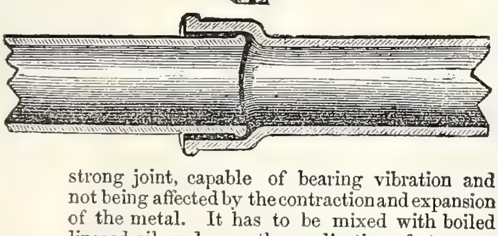
(See drawing, No. 239.)



20. Newcastle Vulcan Cement; S. and E. Ransome, and Co., 21, Essex-street, Strand, W.C.

This cement is stated to contain nothing injurious to metals, and to possess the property of hardening rapidly after being applied, whilst it makes a





strong joint, capable of bearing vibration and not being affected by the contraction and expansion of the metal. It has to be mixed with boiled linseed oil, and upon the application of steam or other heat to the joint, it soon sets.

21. Patent Rotary Steam Engine; R. A. and M. Jefferson, 30, North-street, Saint John's-wood, N.W.

This combination has been arranged principally with the view of avoiding dead weights and destructive friction, so detrimental to rotary engines, without increasing the difficulties of manufacture; to effect which the covers are dished, decreasing the size of the hub which carries the piston; the slides are hinged to the covers, and are so arranged that while in motion they have no weight of steam upon them; they are worked by two lateral cams fixed on the axle, which axle is retained in adjustable bearings to keep it in the centre of the cylinder; the steam enters and escapes through the axle; it is always on, the power on the piston being the same in all positions. The model illustrates the action of one-half of the engine.

(See diawing, No. 232.)

22. Improved Safety Lamp for Coal Mines; Chas. Edwd. Crawley, 17, Gracechurch-street, E.C.

This Lamp combines Crawley and Schneider's improvements with those of Howden and Thresh. Its advantages are stated to be—1st. That it gives considerably more light than any other description of safety lamp without the use of glass; this is effected by means of a tube, open at either end, fixed in the bottom of the lamp, passing through the wick, and protected at the lower end by a double gauze. 2nd. It can be immediately extinguished without trouble. 3rd. It has an insulated handle, which enables the miner to carry it for any length of time without burning his fingers, even were the rest of the lamp to become red hot. 4th. It seldom, if ever, will become red hot, whatever quantity of gas may be burning inside the gauze. 5th. It will, on account of its peculiar construction, consume, whilst burning with a good flame, from one to two feet of gas per minute, thereby tending under ordinary circumstances, to some extent, to lessen the danger. 6th. The lock is rendered perfectly secure by means of a seal, consisting of a very small thin metal disc (with any kind of device stamped upon it), fixed over the lock in such a manner as to render it absolutely impossible for the miner or any one else to open the lamp without breaking the seal, thereby forming a perfect detector. The seal would be varied from day to day, so that the miner would never be able to tell what seal would be used on any particular day. 7th. The great increase, however, in the light would of itself remove the temptation to open the lamp, added to which it gives, if anything, less light when opened.

23. Specimens of Machine-puddled Balls of Iron; William Yates, 31, Parliament-street, S.W.

These specimens of iron were made by Tooth's patent self-acting puddling machine, which is a wrought iron cylinder, lined with fire bricks, and driven by steam power. The charge of pig iron is introduced at the chimney end of the barrel; in the door is a hole for inserting the rake, and which also serves for a peep-hole to watch progress. The barrel is kept stationary during the fixing of the pig, after which it is set slowly rotating and kept so moving till the charge has gone through all the usual stages of boiling, working dry, and dropping, which takes about an hour. The iron now begins to gather into a mass; the speed of the barrel is accelerated to solidify and shape the balls; the workman now, for the first time, has to put a tool to his charge, to cut off from the lump pieces suitable for his requirements; the fire box is now shunted away and the orifice through which the flame had entered the barrel serves as the opening

through which to admit the tongs, which are attached to a small crane affixed to the standing frame of the cylinder ; thus the balls are extracted ready to be sent to the shingling hammer and rolls.

24. Patent Double Corrugated Iron Plate; Moss and Campbell, Sheffield.

This plate is stamped cold, the corrugations being at right angles to each other, and when two plates are united together, so that the corrugations interlock with each other, a resistance to strain is obtained over the whole surface of the joint.

25. Patent Metal for Bearings, Ships Sheathing, &c.; John Gedge and Son, 11, Wellington-street, Strand, W.C.

This metal is a composition of copper, zinc, and iron. From its toughness it is stated to be a suitable metal for bearings of railway rolling stock, or fixed machinery, and being cheaper than copper, and equally unaffected by sea-water, can be used for sheathing ships' bottoms.

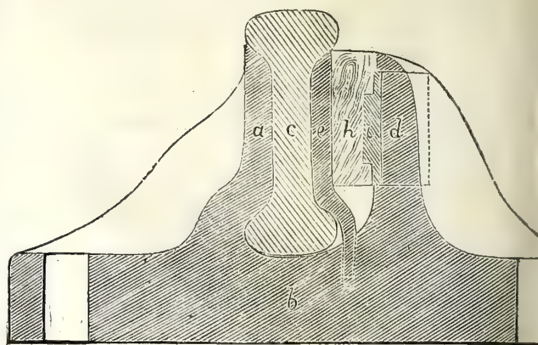
26. Patent Carriage Axletree; Ebenezer Partridge, 14, Park-street, Stourbridge.

27. Patent Lead Plate, being Sheets of Iron coated with Lead; Edmund Morewood, Forty-hill, Enfield, Middlesex.

28. Improvements in fixing and securing the Rails in Cast-iron or other Chairs; Edward Gatwood, 2, Priory-terrace, Holmer, near Hereford.

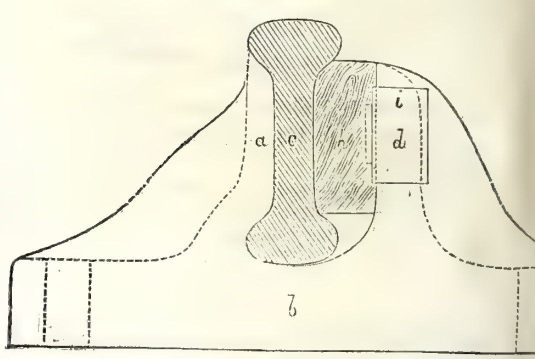
It will be seen by reference to Fig. 1 that the inner surface of the jaw (*a*) of chair (*b*) is made to fit one side of the rail (*c*), and the inner surface of the jaw (*d*) is made in the ordinary way. Between the surface of the inner jaw (*d*) and the rail (*c*) a plate (*e*) is inserted, having on its outer side a projection or projections suitable to enter the recess or recesses in the chair (*b*); or this plate can be made of a kind of angle-iron, with a piece cut out of the centre, so as to form a projection on each side of the chair, which projection will act as a stop, and prevent this plate (*e*) from sliding whilst the key (*h*) is being driven in. This plate may also be used with ordinary chairs. In using either or both of these plates, a wood key (*h*) is employed, of suitable size and form, either taper or not, compressed or not, according to the requirements of the case, with a thin plate (*i*) upon one side, a projection on which fits into a recess in the wood key, preventing it from being cut or injured by the jaw of the chair whilst it is being driven home, and consequently causing it to drive much tighter, and thereby the better securing the ends of the two rails in the chairs. The other side of the wood key is perfectly plain. The plate (*e*) having been inserted, and the wood key (*h*) having been driven home, the ends of the thin plate (*i*) are turned or bent back from the wood key, or a nail or screw may be put through this plate (*i*) into the wood key (*h*), either of which modes is to prevent the wood key from working out of its place by shrinkage. Fig. 2 shows the same, or nearly the same apparatus, as employed

Fig. 1.



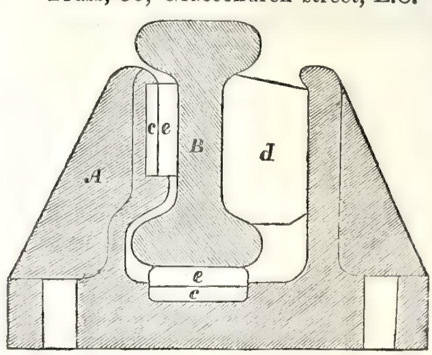
to an intermediate chair, omitting the plate (*e*) shown in Fig. 1. In securing the rails in the intermediate chairs, the aforesaid plan may be adopted, by only using a wood key (*h*), pressed or otherwise, with a thin plate (*i*) on the side of the key coming in contact with the jaw of the chair (*d*), this iron plate, of parallel or

Fig. 2.



wedge shape, to be kept in its place by a projection on the side next the wood key (*h*), and when driven home, the ends of the thin plate (*i*) are turned or bent back from the wood key, or a nail or screw may be put through this plate (*i*), either of which modes is to prevent the wood key from working out of its place by shrinkage.

29. Patent Railway Chair; Thomas Leaville Truss, 53, Gracechurch-street, E.C.

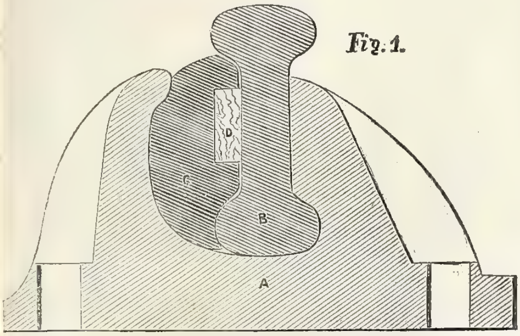


A wooden seating with chemically prepared

wool packing, is introduced at the bottom between the rail and the chair.

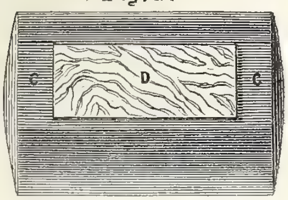
30. Patent Key for Securing Railway Rails; James Morris, 8, Albert-square, Clapham-road, S.W.

Fig. 1.



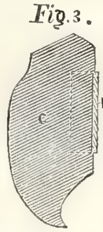
A, An ordinary intermediate chair.
B, A piece of rail fixed in the chair.
C, The patent iron wedge securing the rail.
D, The small piece of wood inserted in the wedge, to act as a cushion and prevent the jarring of the two irons coming together.

Fig. 2.



C, Flat view of the wedge.
D, The small cushion of wood.

Fig. 3.

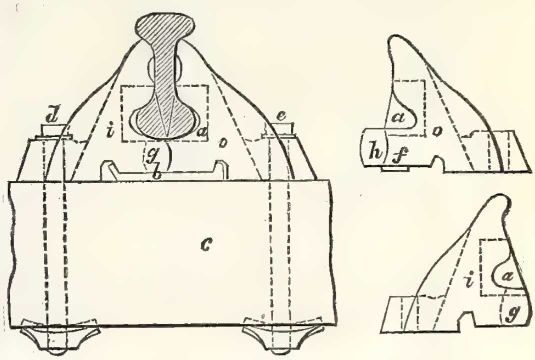


C, End view of the wedge.
D, The small cushion of wood.

These keys for rails are constructed in the following manner. They are made principally of metal, and shaped so as to fit between the cheek of the chair, of whatever description, and the web of the rail, partly filling up the space between the flanges of the rail. On that side of the key or wedge which is towards the rail, a recess is made, and into this recess a small piece of wood on the flat of the grain is fitted, so as to project slightly beyond the surface of the key or wedge. Thus when the key or wedge is driven into its place, the surface of the wooden filling piece will bear against the web of the rail. Keys thus constructed are stated to hold more securely, and to be more durable than wooden keys, and at the same time they have not the rigidity of a key made entirely of metal; they are much less liable to be broken or become loose by the vibration of trains passing over them, which is one great objection to keys made entirely of metal. The small piece of wood is also completely protected from exposure to the weather, and is not affected by either heat or wet, so as to shrink or swell. (See Drawing, No. 235.)

31. Sayer's Patent Railway Chairs; Exhibited by John Gedge and Son, 11, Wellington-street, Strand, W.C.

These chairs are intended for joint and intermediate chairing on railways constructed with single or double T-headed rails. Each joint chair, as may be seen in the illustration, has a cast-iron fillet, *a*, cast into the chair. The object of this fillet is to prevent the rail sliding forward out of



the chair (which is apt to occur where the traffic is great or the gradient steep). If the course of the railway be straight, allowance for the expansion of the rails should be made, by not bringing the ends close up to the fillets. The outer half of the chair, *o*, with the wrought-iron plate, *b*, beneath, is first laid on the sleeper, *c*, and fastened to it by the fang-bolts, *d*. To lessen the concussion, and make a tighter joint, a piece of felt may be placed in the chair. The rail is then placed in the half, *o*, and the inner half, *i*, is then placed and fixed to the sleeper by the fang bolts, *e*, perfectly keying the chair and bottom plate, *b*. The snugs, *f*, on the bottom of the outer half of the chair, drop into slots in the bottom plate, *b*, preventing the plate working out, and, with the rounded joint, *g*, and the tongue, *h*, keep the half chairs together perfectly rigid and firm. It is only necessary to draw the inner fang-bolts, *e*, and slacken the outer bolts, *d*, two half turns, to set the rail at liberty, and replace it with another.

32. Patent Rails, and Bedplate Iron Girder Sleepers and Rails Combined, to block in level with the Paving Stones or Macadam, for Street Railways; Thomas Wright and Co., 9, George-yard, Lombard-street, E.C.

No. 1 shows section of the twin rail, made in wrought or cast iron, and applied to both wood and iron sleepers, also to the bedplate iron girder sleepers and rails combined, suited to both flanged and plain wheels, either with or without grooves in the rail surface. No. 2, Section of twin rail, modification of No. 1. No. 3, Model, full size, showing the bedplate iron girder sleeper and twin

rail combined, also the tubular iron sleeper and twin rail combined, which contains eight separate wearing surfaces "chilled." This model shows the iron sleeper and rail combined laid into the pavement, or between stone blocks, and level with the surface of the road, as in actual use, with a section of a flanged wheel, and also a section of a plain wheel, showing the real effect of both as in practical operation, and that they do not obstruct or endanger the free circulation of the ordinary street vehicles. Loose raised rails with fastenings are not employed, as the Solid Bedplate Iron Girder Sleeper and Rail combined block in level between the stones, and without transverse tie bars, consequently there are no loose rails with their fastenings to be deranged and knocked into pieces, involving danger, continual expense, and the disturbance of the pavement and traffic for repairs; and clear access exists between the bedplate iron girder sleepers for the repairing of gas and water pipes. No. 4, Section of the single or double-headed "tyre bar rail," applied to both wood and iron sleepers, and made in wrought or cast-iron. No. 5, Section of bedplate iron girder sleeper and tyre bar rail combined. The sleeper joints are fished. No. 6, Section of bedplate iron girder sleeper, and "curved" rail surface combined, for working clean in contact with the wheel tyre. No. 7, Section of bedplate iron girder sleeper combined with the ordinary headed rail, made of cast or wrought iron, either solid or in parts. No. 8, Section of bedplate iron girder sleeper and "grooved" rail combined, laid in level with the road, which grooves are subject to every modification. No. 9, Tubular iron sleeper and grooved rail combined, with the joint fastening. The sleepers are made in lengths of 12 feet, and can be modified in size, application, and cost, to suit both light and heavy traffic in streets of towns and highways, and any shape of rail can be fixed to the bedplate iron girder sleepers, or be combined with them in one solid piece, and with hardened wearing surfaces.

33. Pile-Driver; T. E. Merritt, Rochester.

This pile-driver is, as regards the framing, of the usual construction. The peculiarity consists in employing a tangent screw and wormwheel in place of the usual gearing. The tangent screw is worked by cranks in the usual manner, and the axis of the wormwheel carries a grooved drum. In a perpendicular line above this drum is another grooved drum, the bearings of which are fixed at the upper part of the guides. There is a square chain running on these two drums. The chain is endless, and carries lifters, which, as the cranks are turned, elevate the monkey. The monkey continues to rise until the catch which is engaged by the lifter turns over the upper grooved drum; it then falls upon the pile to be driven. As this engine has a continuous motion, and is self-discharging, it is stated that more work can be done by it in a given time than by the usual one. The tangent screw and wormwheel give great power, combined with simplicity, and with perfect safety to the labourers, as no fall of the monkey can take place until the lifter has discharged it.

34. Patent Gas Retort Bed; George Walcott, 24, Abchurch-lane, E.C.

The improvements consist in the economising of fuel, by passing all the fire from the furnace through and through the materials to be acted upon, until the whole heat is absorbed; and also by feeding the furnace or furnaces with a current or currents of heated air to intensify combustion. The fire playing uselessly on the two side walls, and the covering arch in the commonly-built retort-beds, is, by this mode, employed beneficially. A six or any other sized bed of retorts can be changed at once, whether working or standing, into a four, three, two, or even to a one-bed, the retorts not in use being allowed to cool down. A method is also arranged for destroying the incrustation of carbon inside clay retorts. The patent retorts and furnaces are said to be more easily repaired than the ordinary kind, and the first cost is stated to be less. (See Drawing, No. 245.)

35. Chemical Tallow for Lubrication; J. H. Johnson, 47, Lincoln's-inn-fields, W.C.

MACHINERY AND MANUFACTURING APPLIANCES.

(*For the remainder of the Articles in this Section, see Drawings.*)

40. Patent Machine for forming continuous "bats" of Fleece or "sheet sliver" of Wool, Cotton, &c.; James Ferrabee, and Co., Phœnix Iron Works, Stroud, Gloucestershire, and 75 and 76A, High Holborn, W.C.

The introduction of the machine called a "Condenser," which in the manufacture of woollen cloth prepares the thread or roll of wool called "slubbing" ready for the mule or spinning machine, rendered it necessary to have recourse to mechanical means for feeding the "scribblers" and "carders," in order to secure uniformity in the threads. For this purpose the plan designed by Thos. Walker, in 1840, has hitherto been generally adopted. It consists in taking in a transverse direction from one machine, its product in the form of a roping, and conducting it continuously to another machine, but this rolling or twisting of the fleece into a roping as it comes from the doffer is objectionable. The purpose of Ferrabee's Patent Machine is to take up the fleece or sheet sliver in its full width as it comes from the doffer of the scribbler or carder, and fold it into any required width or thickness, in layers upon an endless apron, at right angles to the direction in which it is stripped from the doffer, and so as to form an endless "bat" which may be fed continuously to another machine, or otherwise disposed of. The new machine is composed of a frame carrying an endless apron, which receives the "bat" of wool. On this frame is mounted transversely a compound vibrating frame, carrying an endless cloth or apron, and moving to and fro at an uniform speed, the apron at the same time moving at some appointed speed. The cross or bat apron also moves continuously. Provision is made for regulating the speed of the various parts of the machine, which can be readily adjusted to lay the most delicate fibre with unerring precision. To be put into operation the machine is placed with the receiving apron almost close to the doffer of a scribbler or carder, and as the sliver or fleece is stripped from the doffer by a comb or otherwise, the endless cloth or apron on the vibrating frame carries it forward, and, by means of the traversing motion and consolidating rollers, lays it on the endless cross apron, layer upon layer, to any required thickness. Thus a most thorough mixing of the wool is effected. Materials of different sorts and colours may be separately prepared and incorporated into one bat; the wool or other material is presented to the next machine in the best possible way for undergoing another carding operation, and with ordinary attention in weighing the wool to the first machine a perfectly level and uniform bat is conducted to the carder, and an uniform thread on the condenser secured.

41. Patent Knot-Stitch Sewing Machine; Newton Wilson and Co., 144, High Holborn, W.C.

42. Patent Double-Action Lock-Stitch Sewing Machine; Newton, Wilson, and Co.

43. Patent Lock-Stitch Family Sewing Machine; Newton, Wilson, and Co.

44. Patent Self-acting Sewing Machine; James Boyd, Hither-green, Lewisham, S.E.

The object of this invention is the abolition of the fatigue consequent upon the use of the treadle. The self-action is obtained by means of an apparatus connected with the sewing machine, and which is set in motion by clock-work.

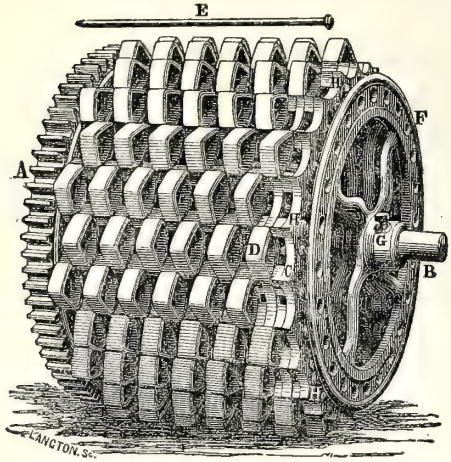
45. Improved Sewing Machine; Geo. Whight and Co., Station-road, Ipswich.

This is a machine, the needle of which, by its peculiar motion feeds itself, and thus renders the usual feed-apparatus unnecessary—thereby rendering all the parts much more simple and avoiding the difficulties incident to most machines, while working rough or loose goods—such as plush, or materials used in quilting with wadding between. The power being communicated directly from the driving wheel to the needle, with but very few intermediate parts, reduces the friction, and renders the machine almost noiseless in its operation, while it may be worked at great speed with comparative ease. The working parts are all adjustable, and can be adapted to all kinds of sewing.

46. Patent Improved Tappet Cylinders, for Fancy Weaving; Thomas Sibley, Moss-street, Ashton-under-Lyne.

The engraving represents one of the tappet cylinders. *A* is the driving-wheel, *B* the shaft, *C* the rings carrying the tappets *D*. The rings *C* are permanently bolted together, and to the wheel *A* by bolts *H H H* as these bolts are not interfered with when changing the tappets. The tappets are kept in their places by pins like that shown and marked *E*, and the pins themselves are retained in their places by a ring *F* which is fastened on the shaft *B* by a set screw *G*. When the set screw *G* in the boss of the ring *F*, is unscrewed, the ring can be turned till the holes

shown passing through it are brought opposite the heads of pins *E*, which can be then withdrawn and replaced when the tappets are arranged in the places they are intended to occupy; then the



ring only requires to be turned back, and fixed by the set screw, and the cylinder is ready for work. These improvements can be applied to all tappet cylinders of the class shown.

47. Patent Centre-Balanced Anti-Friction Weft Fork; Thomas Sibley.

This fork, instead of working on a pivot or pin, works upon two centres, so arranged that it can

Fig. 1.

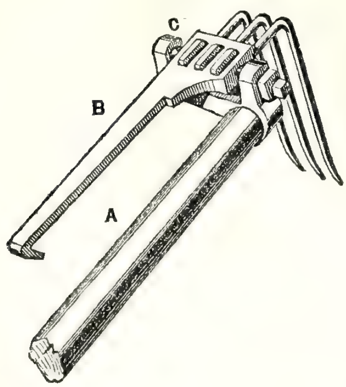
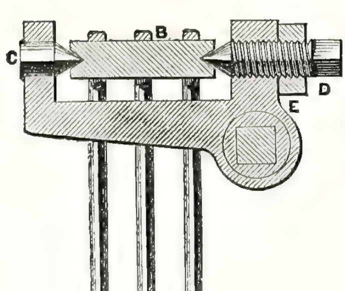


Fig. 2.



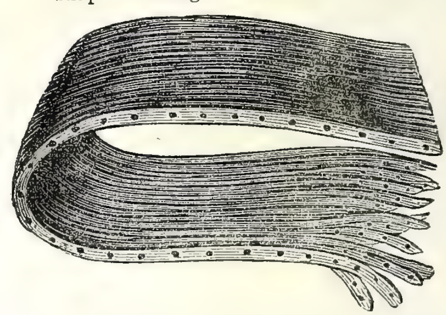
easily be adjusted to a great nicety, and secured in its position by a small lock nut on one of the screw centres. Fig. 1 in the above diagrams represents the fork with the improvements. Fig. 2 is a sectional view of the same, A being the fork-holder, B the fork, C the stationary centre, D the other centre, working in a screw thread in the fork-holder, E the lock nut, for fixing the centre when set to the necessary tightness.

48. Double Crank with Auxiliary Levers: J. C. Bowler, Bowden, near Manchester.

49. Patent Apparatus for Stopping Instantly the Moving Shafts of Machines; M. Marlaise, Aix la Chapelle.—Exhibited by L. de Fontaine Moreau, 4, South-street, Finsbury, E.C.

50. Bryant and Cogan's Patent Edge-laid Leather Driving Straps: James Ferrabee, and Co., 75 and 76a, High Holborn, W.C.

These straps are made from strips of leather of uniform width, set edgewise, and held together by metal rivets. By this mode of working the strap on the edge of the leather instead of on the

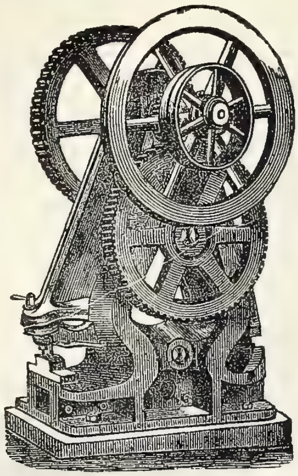


flat, all chance of cracking the grain of the leather and thereby weakening the strap, and ultimately breaking it, is stated to be avoided. These straps may be made of any required length, without laps or cross joints; their thickness being uniform from end to end, there are no weak places; and all unequal strain being avoided, they work smoothly and perfectly straight. They may also be used much slacker than the common strap, as the result of placing the edges of the leather in contact with the drum or pulley, insures a much larger amount of adhesion (or hugging, as it is technically termed) than is produced by the ordinary method.

51. Patent Punching and Shearing Engine; C. de Bergue and Co., Strangeways Iron Works, Manchester.

The inventor states that the improvements in this machine consist:—1st. In the entire absence of necessity for slides or guides for the punch and knives, their rigid attachment to the rocking lever maintaining their true position when in action. 2nd. In the simplicity and efficiency of the stop action. 3rd. In the addition of a pointer alongside the punch which is set to the pitch of the holes to be

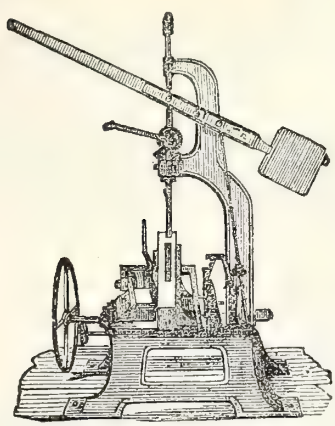
punched, and by which the workman is guided without looking to the punch.



52. Bench Punching and Shearing Machine; Joseph Fenn, 105 and 106, Newgate-street, E.C.

This machine is so arranged that the down stroke performs the punching operation, and the up stroke the shearing.

53. Patent Machine for Mortising and Tenoning Hard or Soft Wood and Boring Wood or Iron; Powis, James and Co., Victoria Works, Blackfriars-road, S., and 26, Watling-street, E.C.



54. Fuller and Davidson's Patent Tube Cutter;—Exhibited by John H. Fuller, 70, Hatton Garden, E.C.

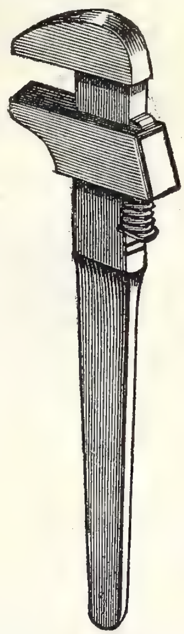
In this instrument the metal tube proposed to be severed is held at three points, irrespective of the cutter itself, so that the latter cannot cut deeper than intended by the operator and so get broken. The tube being severed, both pieces are left as smooth at the end as if the cutting had been accomplished by a parting tool in a lathe. The instrument exhibited is adapted for any tube not larger than one inch.

55. Specimens of Wheel-cutting and Twist-turning; T. E. Merritt, Rochester.

These wheels are stated to have been cut by a cheap addition to a lathe, by which any number of teeth, odd or even, can be cut in a wheel. The screws, also, were cut by an improved detachable addition to the lathe, by which any twist may be produced.

56. Patent Spanner and Screw Wrench; James Ferrabee and Co., Phœnix Iron Works, Stroud, Gloucestershire, and 75 and 76A, High Holborn, W.C.

The new feature in this spanner is the use of a wedge placed between the back of the stem and the moveable jaw. On this wedge the worm is fitted, which works into the teeth on the stem,

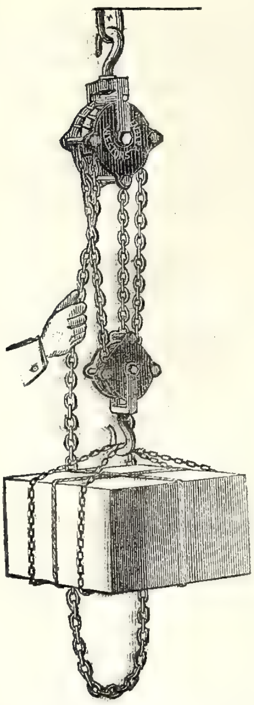


and moves the jaw up or down as may be desired. The wedge slides with the jaw, and is made sufficiently taper to prevent the jaw from sticking when the strain is applied. By this arrangement the strain on the worm and the teeth of the stem is removed, and the spanner acquires all the strength of a solid one.

57. Weston's Patent Differential Pulley Blocks; S. and E. Ransome and Co., 31, Essex-street, Strand, W.C.

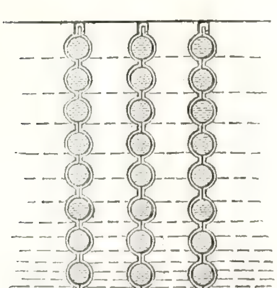
This block is constructed on the principle of the differential cylinder. In the specimen exhibited, the upper block has a double chain-wheel of two different diameters, with spaces respectively for 20 and 22 links of the endless chain geared to it, forming two loops, in either of which may be placed the single block, having a hook for attaching the weight to be hoisted. At each revolution of the double chain-wheel in either direction, 22 links of chain pass over the larger diameter, and 20 links over the smaller; each

loop hanging from opposite sides of each diameter, one of the loops is shortened, and the other equally lengthened. Reversing the direction in which the double chain wheel revolves, has a like effect on the motion of each loop. A weight, hanging by the single block in either loop does not run back, because the opposite sides of the oop pull against each other on opposite sides of

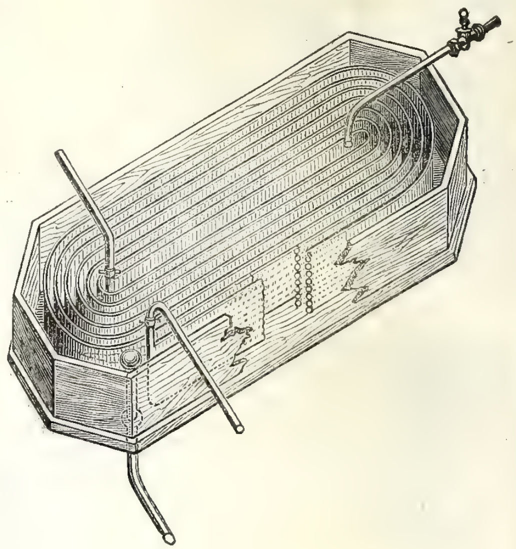


the double chain wheel. Even if the chain is suddenly released whilst hoisting or lowering, the weight will not run down. The purchase is 22 to 1, because, pulling 22 links of chain over the larger diameter, lifts the weight the length of one link. The purchase may be varied by varying the difference of diameters in the double chain wheel, or with the same difference of diameters, by equally diminishing or increasing them both.

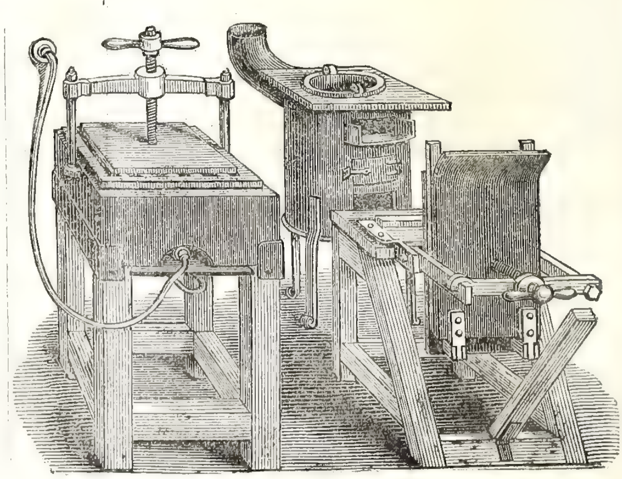
58. Patent Refrigerator; Robert Davison, C.E., 8, London-street, City, E.C.



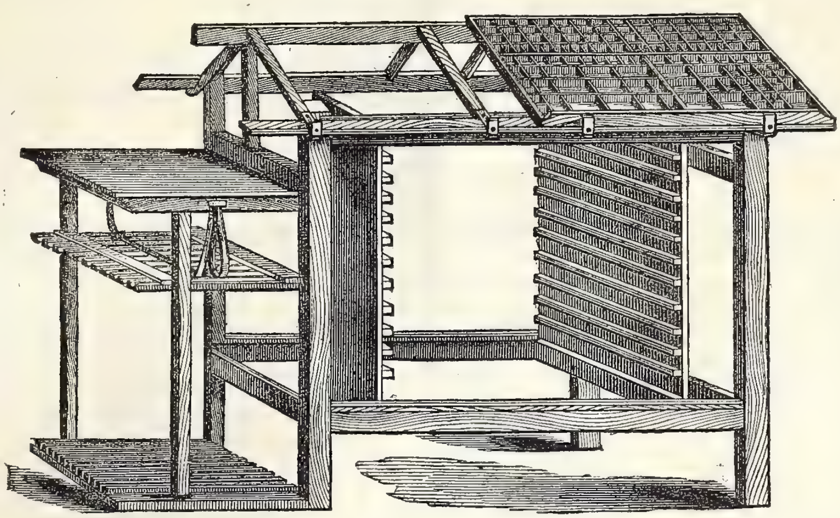
The improvements in this instrument consist in rivetting, soldering, and jointing together continuously two exceedingly thin corrugated copper plates (well tinned or electro-silvered) in such a manner as to form a large number of cells or tubes for the flow of cold water, whilst the fluid to be cooled is made to pass over the whole of the external surfaces of the tubes; the object being to bring the hot and the cold into as direct a contact with each other as possible, by employing a very thin and good conducting medium between them, and at the same time so constructing the machine as to ensure perfect and easy access to every part for cleansing. The corrugated plates are equally applicable to heating and other purposes, and are so patented.



59. Improved Papier Maché Stereotyping Apparatus; James Wood, 89, West Smithfield, E.C.



60. Patent Printer's Composing Case and Frames; H. W. Poulter, 28, Thayer-street, Manchester-square, W.



The object of the improvements is first to diminish the number of compartments or boxes in the case, and thereby to reduce the distance the operator's hand is required to traverse in picking up the types and spacing the lines out. For this purpose some of the compartments—namely, those devoted to the reception of accented vowels are omitted, and a better disposition of other of the boxes or compartments is obtained, reducing the whole to one case. Further, some of the partitions of the boxes are formed of zinc or other suitable metal to gain space.

61. Portable Self-Acting Card-Printing Machine; C. Langdon Davies, 2, York-villas, Sydenham-park, S.E.

In this invention the cards to be printed are placed in a box mounted in position, so that the lowest card when projected through an aperture in the front of the box shall enter between a pair of small cylinders by which the printing is performed. One of these cylinders is coated with india-rubber, while the other has engraved, cast, stereotyped, or electrotyped in relief on its surface, the design to be printed, the ends of the cylinder being left in relief to nip, or take hold of, the cards, and to turn the inking apparatus by effecting frictional contact with bearings on the ends of the inking rollers. The cards are fed up one at a time by a step on a slide traversing the bottom of the box. Motion is given to this slide by projections on the printing cylinder, which take hold of rods connected with tne feeding slide, advance it a certain distance, and then release it, when it is carried back by springs in readiness for the next card. To perform with this machine all the operations of printing, it is only necessary to turn a handle. The pressure of the printing surface on the card, and the supply of ink, may be regulated to the greatest nicety by screws arranged for the purpose. The inventor states that a machine, 5½ inches long, 4 inches wide, and 3 inches high, would print upwards of ten thousand cards per hour. The machine may be driven by a clock spring.

NAVAL AND MILITARY APPLIANCES, AND PHILOSOPHICAL APPARATUS, &c.

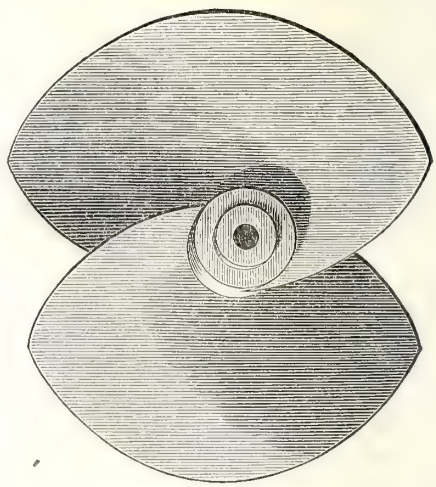
(*For the remainder of the Articles in this Section, see Drawings.*)

70. Patent Propeller; Hermann Hirsch, 65, Bridge-road, Lambeth, S.

The form of the propelling surface may be best understood by considering it projected in section, 1. On a cylindrical surface consecutive with the axis; and, 2. On a plane perpendicular to the axis. I. The cylindrical projection is a curve, the entering edge of which is inclined to the plane of revolution at such an angle that it coincides with the resultant of the vessel's velocity forwards, combined with the circumferential velocity of the blade at that distance from the axis where the section is taken, while the back or leaving edge of the blade is inclined somewhat more to the plane of revolution, or coincides with the resultant of the vessel's velocity, plus slip combined with the circumferential velocity of the blade. From this curvature it results that the blade, as it passes through the water, gives every particle that meets its surface a gradually increasing velocity backwards, and thus receives a constant reactive pressure forwards over its whole surface, without producing sudden shocks or breaking the water into foam. II. The projection of any section of the blade on a plane perpendicular to the axis, is an archimedean spiral. Every point of the surface is thus inclined to its radius at such an angle, as to overcome a great part of the centrifugal force which would be given to the water by blades radiating in straight lines from the centre. The backwater from the propeller is thus rendered less broken or divergent, and consequently more directly reactive in propelling the vessel forwards, and more effective on the rudder for giving ease and rapidity of steering. The effect of the combination of the two curvatures is to extend the propelling surface of the blades over a greater portion of the circle of rotation, and so to divide its action on the water as to make the impulse smooth and gradual, and obviate almost entirely the vibration resulting from straight-bladed propellers. The arrangement for altering the pitch of the blades and securing them on the boss is as follows:—An inner boss is made with two conical surfaces turned on an axis perpendicular to the shaft, with slots on each side to form recesses for bolts that pass through the boss of the propeller with certain space for clearance. The blades are cupped so as to fit accurately on the coned surfaces of the inner boss, and are formed with recesses for receiving the heads and the nuts of the two bolts which secure them thereon. The recesses for the nuts are made of sufficient size to admit a socket wrench for loosening or tightening the nuts, and are filled with pieces shaped to the surfaces of the blades. When the blades have been set round on the conical boss to the desired pitch, the nuts are tightened up, a wedge-shaped filling-piece is placed on each nut, and the upper filling piece (which is slightly sloped on its under side to suit the inclination of the wedge-shaped piece,) is driven tightly into the recess, so as to strain the nut down in its place, and secured by a screw entering it from the back of the blade. By this arrangement great simplicity and security are attained, for instead of numerous bolts, nuts, keys, and the like, which in many other propellers have to be adjusted and secured whenever the pitch is altered, there are in this case only two bolts and nuts to be secured, and the wedges and filling-pieces are large and easily handled without the necessity for great care and delicacy. It is found practically that the blades of a large propeller, constructed in this manner, can be shifted and secured again in a few minutes.

71. Improved Eccentrical Propeller; W. H, Crispin, Stratford, E.

In this propeller the power is stated to be greater than that of a screw of the common form containing the same area, it being less liable to be clogged or fowled; for, while revolving, it repels any floating substances which may be near it, the blades also clearing each other. Facilities are also attained for turning astern, and the ship

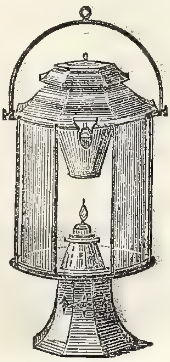


will steer better—a large portion of the rudder being below the action of the propeller. The edges of the blades (which are flat and not forming any portion of a screw) may be made thin and sharp, and, being on the curve, will divide any cordage, &c., with which they may come in contact; and, when applied to ships of war, they possess the advantage of being, under all circumstances, entirely submerged. Either spherical bosses or cylindrical spindles or shafts may be employed. (See Drawing, No. 249.)

72. Improved Plug for Boats; E. P. H. Vaughan, 15, Southampton-buildings, Chancery-lane, W.C.

73. West of England Ship and House Lantern; P. I. Marshall, 32, Treville-street, Plymouth.

This lantern has an octagonal stand, supporting a circular metal frame, the upper ring of which is connected to the lower by small rods or bars. There is a circular glass fitting into the metal frame, and also fitting round the candle-holder,



which can be removed. The candle-holder has holes formed in it, to admit air into the lantern from the stand, which is also perforated. There is a chimney above the candle which can be removed, and a reflector placed round the chimney and resting on the upper edge of the circular glass, which can also be removed. There is an octagonal cover hinged to the upper ring of the frame, and the upper part of this cover is perforated, for the exit of gas and air, and is further provided with a cap, having a round bottom, the lower part of which is exposed to the heat and smoke arising from the candle, which pass through the perforation round it. There is a handle with a swivel eye in the centre, for suspending the lantern. The lantern is provided with a hasp for fastening, and further secured by a pad-lock.

74. Major Rhodes' Patent Volunteer and Rifle-Practice Tent; S. W. Silver and Co., 66, Cornhill, E.C.

The supporting frame-work of this tent is composed of a series of straight laths, rods, &c., which, radiating from the apex of the tent in an inclined position to its eaves, and from thence prolonged by vertical rods or supports to the ground or base line, form its chief point of construction. At their junction they are hinged and braced. The eaves and ground ends of the supports are further strengthened by means of two continuous ropes—wire-ropes or such like ties. Although the model is of an hexagonal shape, square, octagonal, oblong, or other forms can be constructed. The frame is covered with a prepared waterproof cotton tissue, double on the roof, and, if requisite, the sides are of double tissue. The model represents an hexagonal tent on a scale of 9 feet diameter—8 feet 6 inches to the apex—and the height of walls to the eaves is 5 feet 9 inches. The weight of a 9 feet Volunteers' Tent, complete with screw pegs and storm-lines, and packed in a strong canvas covering, is from 80 to 90 lbs.

75. Patent Open-Air Cooking Apparatus; Samuel Terrill, Redruth, Cornwall.

This apparatus consists of six ovens, four for baking and roasting, and two for warming; it has also an arrangement for four boilers for hot water, meat, and vegetables. Over the fire there is a hot-plate for general purposes. On the top of the stove, on each side of the chimney, there is an opening on which vessels may be placed for boiling. This model shows a double stove, but it can very readily be made as a single stove, with only three ovens on one side, instead of three ovens on each side. The stove can be used for ships, barracks, camps, &c.

76. Patent Rifle-Sight Guard and Regulator; Captain Jaques, Droylsden, near Manchester.

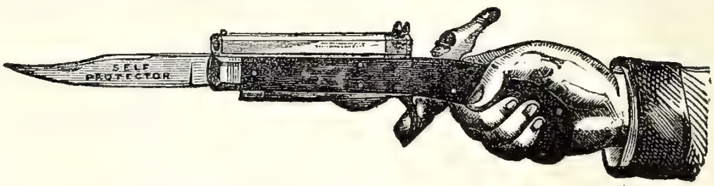
The face-sight of the rifle is protected by a rotatory collar, the ramrod keeping it in position by acting as a spring at the back of it. When shooting, the collar is turned half round, and the sight exposed for use.

77. Patent Compression Trigger; Matthew Paris, Hill-side, Wimbledon, S.W.

This trigger is pressed, and not pulled, by the finger, and in the inventor's opinion is less liable to accident. A lighter sear spring is used than in the ordinary trigger, whereby greater accuracy in practice is obtained.

78. Saloon Pistol Knife; Unwin and Rogers, Rockingham Works, 124, Rockingham-street, Sheffield.

This article contains a penknife and self-protector blade, which may be either shut or left open and used as a bayonet. An ammunition box is attached to the pistol and knife, forming the handle, which will contain a number of charges



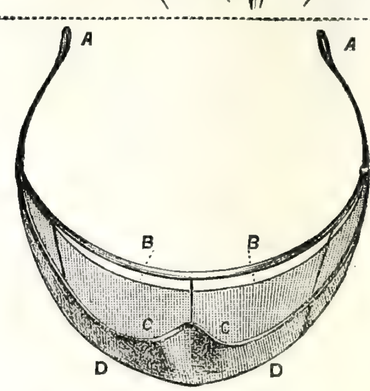
or bullet caps. The pistol knives are loaded at the breech; the bullet cap or cartridge should be inserted when the hammer is at half-cock; the hammer can be either pulled to full-cock ready for discharging, or let down upon the cap and left ready until required. When the hammer is pulled up the trigger will come out ready for use. After the piece is discharged, the spent cap must be pulled out with the reliever, and a fresh one introduced in its place; they can thus be loaded and fired several times a minute.

79. Bi-valve Inhaler; John White, Finchley, Middlesex, N.

In breathing through this instrument the air to be inhaled and the exhaled air are guided through separate channels by means of two valves, capable of being moved in opposite directions by the passing air; and the air to be inhaled is brought into contact with a perforated disc kept wetted by revolution, with half the depth of its diameter in water or medicated water, as shown in the form of the inhaler A, or the air to be inhaled is brought into contact with a wetted surface, as in another form of the inhaler B, by filling the upper chamber of the vessel with the liquid and connecting it with the lower chamber of the vessel by means of cotton threads or other substance along which the liquid can be moved by capillary attraction, and through which the air to be inhaled is guided by the valve. By such contact with water or medicated water, hot or cold, the air is purified or medicated, and warmed or cooled respectively.

80. The Occhiombra or Patent Transparent Ventilating Eye-Shade; J. Calkin, 12, Oakley-square, N.W.—Exhibited by Weiss and Son, 62, Strand, W.C.

The Occhiombra is constructed to exclude wind-dust, and excessive light. It consists of a light



wire frame, part of which resting on the nose passes close to the face beneath the eye, passing upwards to the temples—the other part of the frame presents the usual appearance of an eye shade, but is more symmetrical in its outline. A lengthened portion of the upper part of the frame passing round the forehead, is double, leaving an opening between the two portions for the free escape of heat generated by violent exercise. The whole is covered with gauze or other material—either single, double, or treble, to meet in the latter cases the requirements of those suffering from any affection of the eyes, and in the former the mere desire of protection from wind, dust, and sun. The whole forms a closed chamber, admitting the free use of spectacles; the shade fits the head by its own elasticity, and is placed and removed with perfect ease—its weight is half an ounce. It is intended for travellers by railroad, and those who visit the sea-side.

81. Bivalve Respirator; John White, Finchley, Middlesex, N.

By means of two valves fixed in separate chambers, and which valves are capable of being moved by the breath in opposite directions, the air to be inhaled and the exhaled air pass over separate surfaces, and therefore the inhaled air is not loaded with the moisture and other impurities of the exhaled air, as in other respirators, but it is warmed.

82. Invalid Tongs; Weiss and Son, 62, Strand, W.C.

These tongs are for taking hold of anything out of ordinary reach from the bed or sofa. They are also useful for a library table, or in a shop, for taking down anything from a window or glass-case.

83. Hydraulic Eye-drop Tube; J. C. Savery, M.R.C.S., Marina, St. Leonards.

This tube has a portion of its side elastic, and thus a drop of fluid may be drawn up, and easily ejected by renewed pressure.

84. Rostaing's Compounds of Gutta Percha with Mineral and Vegetable Colours and Substances for Dental and other Purposes.—Exhibited by John Gedge and Son, 11, Wellington-street, Strand, W.C.

For dental purposes the crude gutta percha is first purified from earthy and other matters soluble in boiling water, and then from oily and odorous parts soluble in alkalies; it is then heated to 110 deg. or 120 deg. Réaumur, to soften the substance; oxyde of zinc, dense white or coloured, and a preparation of tannin, are added, and the whole carefully mixed, and when it is desirable to give an agreeable odour, oil of peppermint or lavender, or an essential oil, mixed with a solution of gutta percha in chloroform, is added. Some of the preparations exhibited are composed of gutta percha and a mineral combination of blende, kaolin, and calamine, varied by the addition of a little catechu. The patent mineral colours used in combination with the gutta percha are unalterable and non-poisonous.

85. Angola Belt; W. Elstob, 19, Woodstock-street, Oxford-street, W.

This belt is to be worn round the loins, and is so shaped as to prevent pressure upon the stomach.

86. Elastic Air Pads or Cushions for Trusses, and the Covering of Truss Springs with Elastic Rubber; J. Blackwell, Surgeon's Cutler, 3, Bedford-court, Covent-garden, W.C.

87. Patent Machine for Exercising the Human Body; John Milnes, Bristol-road, Gloucester.

88. Specimens of Aluminium and Aluminium Bronze; Bell Brothers, Washington Works, Newcastle-on-Tyne.

The specific gravity of aluminium is 2·5, or about one-fourth that of silver, and thus, weight for weight, the bulk of aluminium is four times the bulk of silver. It does not tarnish by exposure to the air, has no perceptible odour or taste in the mouth, is malleable, can be forged, either hot or cold, equally well with gold and silver, and rolled into thin sheets or leaves; is ductile, so as to be capable of being drawn into fine wire. It further resembles silver in elasticity and tenacity, and, when cast, in hardness. When hammered, it takes the character of wrought-iron, with elasticity and considerable rigidity, sounding like steel, when let fall on a hard body. It is extremely sonorous, and Mons. Lissajous has made tuning-forks of it, which act extremely well. It melts at a temperature a little above that of zinc, and considerably below that of silver. Aluminium may be readily run into moulds, and when heated to a high temperature in the crucible, loses none of its weight. From experiments made by Deville, he deduces its power of conducting electricity to be eight times that of iron; and as a conductor of heat it stands high amongst metals. According to this chemist, water, whether hot or cold, has no action upon the metal, even at a red heat near the point of fusion. It is, however, slowly oxydised when steam is passed over it at a white heat. Sulphuretted hydrogen has no effect upon it, nor has sulphur itself, so long as the metal is not heated higher than a red heat, though at a higher temperature they combine, forming sulphide of aluminium. Sulphuric acid, so diluted as to attack metals which ordinarily decompose water, has no action upon it whatever; and, according to De la Rive, the contact of a different metal, as in the case of pure zinc, does not help to dissolve the metal. Nitric acid, weak or strong, at the ordinary temperature, does not act on it, but when boiling it slowly dissolves it. Hydrochloric acid, whether weak or strong, is the true solvent for aluminium. Alkaline solutions have an energetic action on it, but caustic alkalies have no effect upon it, even when in a state of fusion. Ammonia exercises a feeble action. The organic acids, such as vinegar, tartaric acid, etc., have little or no action on it. The effect, however, of a mixture of vinegar and salt is different, for in this instance a small amount of hydrochloric acid is set free, which acts on the metal, but even this action is extremely slow, much slower than on tin. The salts of tin, too, have a strong flavour, whilst the salts of aluminium are less

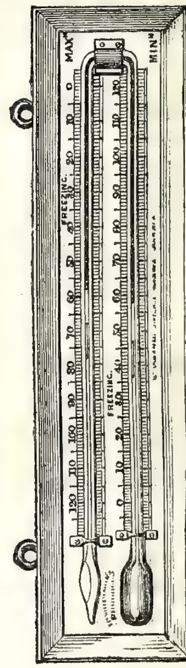
in quantity, and have little or no flavour. Deville considers that the action of sea water on aluminium is decidedly less than on copper. It can be gilt or plated by galvanic agency, but acid instead of alkaline solutions must be used. A coating of copper may in like manner be given. The effect produced on it by saliva is very slight, scarcely perceptible, even when the metal was kept for a long time in the mouth. Up to the present time no solder for joining it has been found which is satisfactory, though it is stated that M. Mourey has succeeded in this object, but his process is not known. M. Hulot has proposed to effect this object by covering the surface with a deposit of copper, and then employing the ordinary solders. The solution of this problem would tend much to bring the metal into general use. The alloys of aluminium and copper forming what is termed aluminium bronzes, are remarkable. That composed of 10 per cent. of aluminium and 90 per cent. of copper, is probably the most remarkable. It is a perfect chemical combination, and has no tendency, as is the case with ordinary alloys, to separate under the influence of heat. These proportions represent an exact number of chemical equivalents of the two metals. Aluminium bronzes are of a yellow or orange colour, closely resembling gold, and take a fine polish equal to that of steel. The chemical properties are the same as those of other copper alloys. In tenacity they fully equal steel. Drawn into wire No. 16 guage, the breaking strain of copper, according to Mr. Gordon, was 190, of iron 280, of aluminium bronze 434; showing a strain of 84 kilogrammes to the square millimètre. Good French iron, in Deville's experiments, broke at a strain of 60 kilogrammes the square millimètre, and steel wire at a strain of from 90 to 100 kilogrammes. It thus appears that steel, and that of a fine quality, only can stand a comparison with aluminium bronze in respect of tenacity. As regards hardness, a comparison was made between a steel and a bronze groove for the guide blocks of a locomotive engine, and, after six months' use, no trace of wear was perceptible; the bronze gave a result equally good with the steel. It was also tried for the journals of the front wheel of a locomotive, with excellent results, its great malleability, combined with hardness and tenacity, rendering it well adapted for this purpose, where ordinarily a very brittle alloy is used. The bronze containing 10 per cent. of aluminium can be rolled at all temperatures, from cold up to a bright cherry red. It rolls well at a bright red heat, breaks less and elongates more than pure red copper. It is difficult to roll cold, and after a number of passes through the rolls, it elongates no further; it is then necessary frequently to reheat it, as it hardens rapidly under the rolls. It is desirable to roll it at as high a temperature as possible, short of fusion. Reheating and plunging in water to cool, renders the alloy more tractable than simply reheating without dipping. If reheated to a bright red heat, and not dipped in water until it has been left to cool in the air down to a low red heat, it is sufficiently malleable and ductile, when cold, to bear without breaking the ordinary manipulations in working it, except some descriptions of stamping.

89. Improved Lind's Anemoscope; J. Charles Savery, Marina, St. Leonards.

The scale is fixed and greatly enlarged, the cowl only moving in a tube of glycerine. The scale tube is charged with water, and a self-registering index can be applied.

90. **Dimenuon Thermometer for Registering the Maximum and Minimum Temperature; Frankham and Wilson, 12, Wilson-street, Gray's-inn-road, W.C.**

The bulb of this thermometer is filled with a fluid considerably denser than the spirit heretofore used for the purpose. In this consists the novelty of the invention. By thus using a dense fluid, the thermometer may be placed in a horizontal position without getting out of order

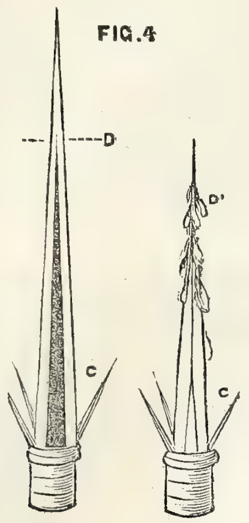


thereby securing increased portability. The fluid selected expands equally like mercury. The indices are of steel, incased in glass, consequently they cannot corrode, and, having no springs, may be set either with or without a magnet. In the horizontal arrangement of the tube the equilibrium of the fluid is not disturbed when the thermometer is exposed to low temperatures.

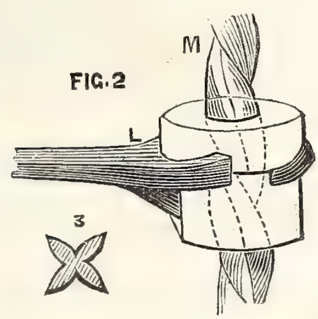
91. Lightning Conductor and Fittings; James Spratt, 118, Camden-road Villas, N.W.

Fig. 4, letter C, shows the platinum silver alloy reproducing lightning conductor point, the object being to provide against the destruction of lightning rod points by melting, as not unfrequently happens from an overcharge of the electric fluid. This is effected by forming the point of different metals or alloys, imbedded one within the other, arranging the most fusible to the outside, and so on in succession, each metal terminating in a fine point. The effect of this arrangement is that the fusing action of an excessive shock of electricity is confined to the

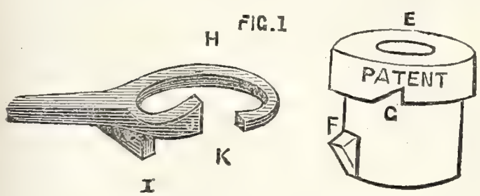
outer metal surface or layer, which it melts, and in flowing may be said to carry the electric fluid with it, or rather it becomes, in the act of melting, an additional conducting power; the metal so melted, destroys the outer point, but at the same time the point D, of less fusible metal



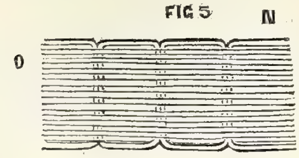
is produced equally as efficient as the first. C D also represents a point that has passed through this electric ordeal. Fig. 2 shows the



patent glass lock insulation and metallic attachment L complete. Fig. 1, letter E, the glass insulator. F the lug or stop. G the indent that forms the lock. H the metallic attachment.



I the stop to stay the lug F on the glass insulator. J the tooth to correspond, and fall into indent G, which locks the insulator and prevents its displacement. K, the opening permitting the entrance or withdrawal of the rod at any time, and also to allow the lug F on the insulator to descend, and thereby to pass round to the stop I on the attachment. Fig. 5, N the flat woven lightning conductor, composed of positive and negative elements, to produce constant electrical



excitation in the conductor, thereby favouring (as it is stated) the conducting powers of the lightning conductor. Fig. M the cross section

of the conducting rod shewn No. 3, Fig. 2, by which arrangement a small amount of metal presents a large surface and affords great strength. The leaves or bars of this form of rod may be either straight or spiral.

92. Method of Coating Electric Telegraph Wires; Joseph Rogers, 9, Queen-square, Bartholomew-close, E.C.

The conducting wires are coated with a suitable insulating material. Strips of woven fibre, tapes, or felt, previously saturated with a compound that furthers the insulation, are then bound round. Cords or wires, which have been previously covered with yarn, and prepared by a heated cement, are laid round in one or more series; if more than one series, then each alternate series is laid in an opposite direction, and bound round with wire, wire and yarn, or woven fibrous material, or braided over, the binding wires being used to regulate the gravity and protect the cable from abrasion.

93. Submarine Telegraph Cables; Josh. Rogers.

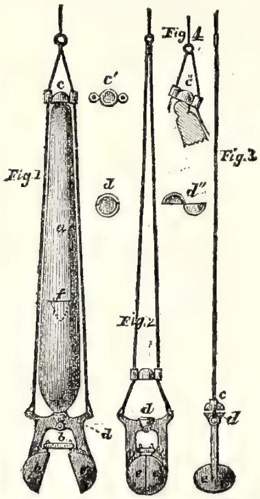
The conducting wire, or strand of conducting wires, is first insulated with India-rubber, or gutta-percha, or both; they are then surrounded with a strengthening of flat plaited bands or cords, which have been previously prepared by immersion in a cauldron of heated cement, and are bound round and compressed in one or more series previous to receiving an external braiding of yarn, which is again saturated with a compound which renders the cable impervious to water or the attacks of animalculæ. If more than one conductor is used, they are laid together and bound round with strips of woven fibre, tape and thread, but braiding over is preferable; any number of conducting wires can be enclosed.

94. Telegraphic Wires and Cables; John Macintosh, 40, North-bank, Regent's-park, N.W.

95. Deep-Sea Sounding Machine; G. C. Wallich, M.D., 17, Campden-hill-road, Kensington, W.

The improvements in this machine consist, 1st, in the abolition of any permanent shaft or cen-

tral piece, and in causing the sinker to perform the temporary office of such shaft during the descent of the instrument, at the same time that, by its weight. acting at *d*, it serves to keep the cups open; 2ndly, in the provision of an independent closing power for the cups, this being supplied by an india-rubber spring or band, as shown at *b*, Figs. 1 and 2; 3rd, in the detaching cap, *c*, the advantages gained by this arrange-



ment being, that the cups and cap only having to be hauled up from the bottom, the weight and resistance are reduced to a minimum; there is no risk of the specimen of the bottom being lost by accidental opening of the cup when being hauled up; and lastly, there is simplicity of construction, together with shape best adapted to sink rapidly through the warer. Fig. 1 shows the machine as descending; Figs. 2 and 3, as being hauled up, front and side views; Fig. 4, the disengaging action of cap; *c'*, view of cap from below; *d'*, *d''*, views of conical seat for sinker, as seen when cups are open or shut; *f*, dotted line, showing mode in which sinker is divided into two portions, the apparatus of which may be employed alone at moderate depths.

96. Patent Bivalve Diving Apparatus: John White, Finchley, Middlesex, N.

This apparatus enables the diver to breathe under water by means of two pipes communicating with his mouth and the air, each of which pipes is furnished with a valve capable of being moved by the force of the breath in a direction opposite to the other, so that the air to be inhaled and the exhaled air pass through separate channels, and the thorax and abdomen are encased in an inflexible material to the end that the weight of the water shall not prevent the action of the respiratory muscles.

97. Patent Life Scarf; T. Ayckbourn, 17, Bond-street, Vauxhall-cross, S.W.

This is a life preserver in the shape of a scarf, which is constructed of ordinary materials, but doubled, and within the inner folds of it, at suitable distances apart, are placed a series of hermetically sealed india-rubber air tubes, cured in the sulphur bath, so as to stand any climate. It is passed round the neck, across the chest and back, and the ends tied in a knot in front.

98. Patent Life-Vest; T. Ayckbourn.

This is constructed on the same principle as Ayckbourn's Patent Life-Scarf. The vest is made of a stout material, to cover the chest and back, having shoulder straps, and an opening at one side only. The material is double, and throughout the area of the chest, internally, are placed about 18 india-rubber air tubes hermetically sealed, whilst about 12 of them are placed on the back; when worn under a Guernsey frock it presents no awkward appearance, and does not hinder ordinary work or rowing, and is stated to be far preferable to cork for buoyancy and convenience.

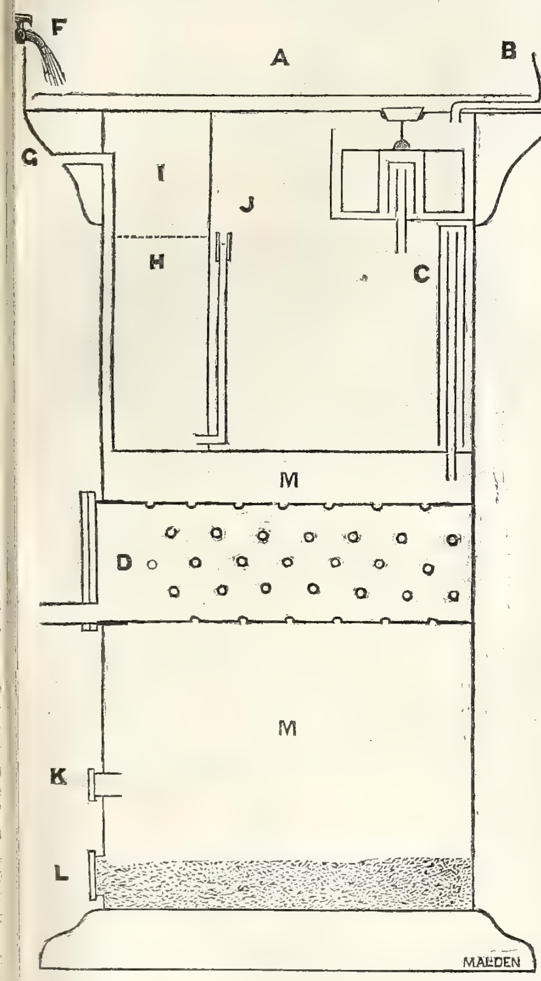
99. The Stereotrope or Stereoscopic Thaumatrope; William Thomas Shaw, 110, Bunhill-row, E.C.

This instrument consists in an application of the principle of the Stereoscope to that class of instruments variously termed Thumatropes, Phenakistoscopes, Phantascopes, &c., which depend for their results on "persistence of vision." In these instruments, as is well known, an object represented on a revolving disc in the various positions it assumes in performing a given evolution, is seen to execute the movement so delineated; in the Stereotrope the effect of solidity is superadded, so that the object is perceived as if in motion, and with an appearance of relief, as in nature. Pictures for this instrument may be varied infinitely, the only limit being the skill and ingenuity of the photographer, and it is peculiarly fitted for the representation of all kinds of machinery in motion. (See Proceedings of the Royal Society for Jan. 10th, 1861.) (See Drawing, No. 255.)

100. Patent Self-Acting Photographic Washing Apparatus and Chemical Filter; John Moule, 15, Seabright-place, Hackney-road, N.E.

This is intended for washing photographic prints and collecting the silver from the washings. The prints are placed on the false bottom of the washing trough A, which is supplied with water by means of the tap F. When the water rises to the height of the lip of the funnel of the waste-pipe B, it passes into "the float chamber" beneath; and, when this chamber is filled to a certain height, "the float" begins to iise, and, at the same time, it lifts the valve attached to its upper surface, which, when at rest, accurately fits a conical hole in the bottom of the trough A: this is in consequence emptied of its "washings," which, in the first place, pass into the float chamber, and ultimately (by means of an aperture in its upper part and a syphon tube covered by the float) into "the mixing chamber." As soon as a sufficient amount of liquid has accumulated in this to reach the top of the tube J, it passes down into the "salting chambei" H, and is there saturated with chloride of sodium, by means of crystals of that salt placed in a perforated compartment, I. As soon as the washings have accumulated sufficiently high to reach the top of the syphon C, and start the same, a flush takes place from the chamber H, and a part of

its contents return charged with salt, and the mixture is then carried over into "the precipitating chamber" MM, by the action of the syphon C; here the chloride of silver formed settles to the bottom and accumulates, and the superabundant liquid is carried off, after passing through "the filter" D, by a waste-pipe E. This filter is formed of a perforated tube, filled with cotton wool and zinc filings, so arranged that any particles of unprecipitated silver salts that may have escaped the first attack may be reduced by the zinc and retained in the interstices of the wool. G is an air tube, which, however, may be connected with the developing sink, so that its draining may be carried into the lower vessel M. K is a capped tube, for drawing off the supernatant liquid, when it is wished to re-



move the precipitated silver salts through the stoppered aperture L. All the parts exposed to the action of the solution are constructed of a material that is impervious to water and the chemical action of acids, &c., and, therefore, not likely to readily get out of order. The frequency of the change of water in the trough B is regulated for any given interval of time by the adjustment of the supply by means of the tap F. The compartment H, once charged with a saturated solution of salt, and rock salt placed on the perforated bottom, I, is calculated to be sufficient to precipitate about fifty ounces of silver; and, beyond keeping the compartment I charged with salt, no other attention is requisite. The washing trough may be used as a sink where developings are carried on, by which a large amount of silver can be saved which is at present lost.

101. Patent Mica Magic-Lantern Slides for Dissolving views, &c.; F. Leiss, 31, Queen-square, Bloomsbury, W.C.

These articles, hitherto painted on glass, are made of the mineral mica, by printing figures, groups, &c., upon sheets of this mineral. These coloured sheets are fixed between glass.

102. Patent Tenor Horn; George Macfarlane, 15, Draycott-street, Sloane-square, Chelsea, S.W.

This Horn has a revolving bell, to throw the sound in any direction the performer pleases. The arrangement is also applicable to other brass instruments.

103. Patent Pianoforte Expanding Desk and Adjusting Candle Slides; H. Brooks and Co., 31 to 34, Cumberland-market, Regent's-park, N.W.

The music desk is divided in the centre, and may be expanded so as to give a wider support to the music. The candle-rests slide on a bar.

104. Patent Self-Fixing Music Stool Screw; H. Brooks and Co.

The head of the female screw in which the male screw works is notched, and studs attached to the head of the male screw are pressed into the notches when the stool is sat upon.

105. Patent Eight-Day Weight Clock Beating Seconds; John Aitken, Watchmaker, Dalry, Ayrshire.

This improvement is more particularly adapted for turret or other clocks, where the necessary depth for the length of the pendulum cannot be conveniently obtained. In this invention the back fork or crutch which imparts momentum to the pendulum is fitted on the pallet or bar, with the crutch extending upwards, or in a direction the reverse of that in which it has hitherto been employed. The crutch is prolonged beyond the pallet or bar, in a downward direction, to serve as a counterpoise weight, keeping the upper part in a vertical or balanced position, and so that it will not fall over either to the right or left until acted upon by another force. The point of suspension is raised above the crutch at least twice the length of the upper part of it.

106. Religious Watch or Clock Dial; Amott, Brothers, and Co., 71, St. Paul's Churchyard, E.C.

107. Patent Inlaid Silver Watch-Cases; Henry Williamson, 10, Russell-terrace, Chapel-fields, Coventry.

These cases are inlaid with gold in various patterns.

AGRICULTURAL IMPLEMENTS, MACHINERY, &c.

(*For the remainder of the Articles in this Section, see Drawings.*)

120. Patent Steam Cultivator; J. T. Carter, Sydenham, S.E.

This machine cultivates the width of half a rod of land at once, and it will finish the land ready for the seed, or it may be left in ridges for wintering. The steam engine is portable, and can be detached from the machine and used for other purposes. The machine only requires one man and two boys to work it, and it is stated that it can cultivate from 7 to 14 acres per day.

121. J. and F. Hancock's Patent Pulverising Plough; Andrew McLaren and Co., 174, Upper Thames-street, E.C.

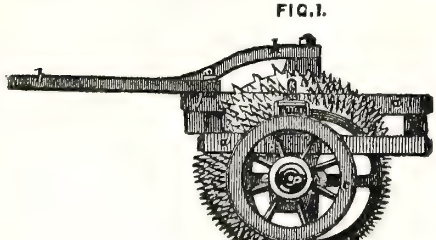
This implement consists of three ploughs attached to one beam, all acting in the same plane, but at different depths. Thus the first share may be adjusted to cut two inches deep and turn over the parings into the bottom of the furrow; the second share may be adjusted to cut two inches below the first share, and turn this portion of the soil on the first parings; and the third share can be adjusted to cut two inches below the second share, and turn the whole of the cut soil on the two preceding cuts; thus burying the grassy top, and covering it with a fine tilth of pulverised soil the whole depth of the furrow, making a better seed bed than it is possible for the plough, harrow, and drag, all put together to produce.

122. De Buyer's Cast Iron Plough Wheels; Exhibited by John Gedge and Son, 11, Wellington-street, Strand, W.C.

The improvements consist in casting the wheel in one piece of cast-iron, or casting over a partial or entire skeleton of wrought iron. The nave is formed for the admission of a wooden or an iron axle, and has within it a cavity intended to hold grease and lubricate the axle. These wheels are very light and strong, and are said to be produced (as compared with other wheels) at a very small cost.

123. Machine for Breaking up Macadamized Roads; James Braby, jun., 32A, Newington Causeway, S.E.

FIG. 1.



This machine is intended to supersede the use of pick axes on Macadamised roads. It is formed of two conical rollers, placed at certain angles to each other, and provided with transporting wheels which are adjustable at pleasure. It is drawn by horses, and the shafts are made to turn on a

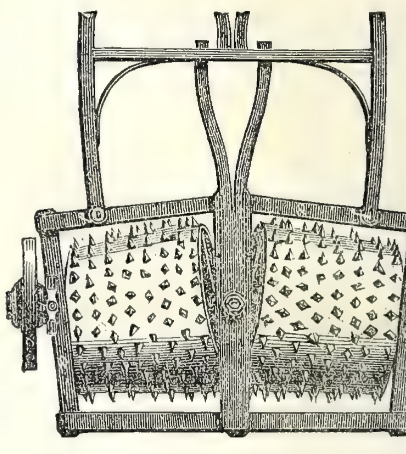
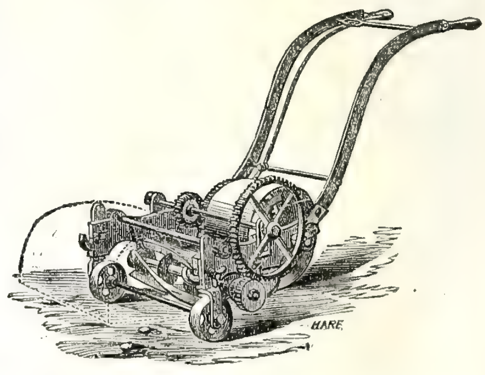


FIG. 2.

centre pin, so that the horses can travel in the opposite direction without turning the whole machine round. The machine produces the same results when propelled forward in either direction. (See drawing No. 237.)

124. Patent Lawn Mower; James Ferrabee and Co., Phœnix Iron Works, Stroud, Gloucestershire, and 75 and 76, High Holborn, W.C.



This lawn-mower has all the working parts disposed and supported in an iron frame which is cast in one piece, thereby securing simplicity and strength. The handles are of wrought iron, and

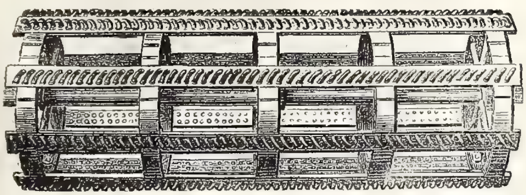
the adjustments of a very simple character. The machine is light, and may be worked easily by a boy; it is therefore available on the smallest lawns.

125. Patent Brush Lawn Mower, with Mainwaring's Patent Silent Gear; James Boyd, Hither-green, Lewisham, S.E.

This is an improvement upon Boyd's brush lawn mower. The self-cleaning and sharpening apparatus of the old machine is by this arrangement made completely silent, and at the same time the power required to work it is lessened.

126. Patent Combined Garden Roller and Seat; Tindall and Maude, Sherwood Foundry, Mansfield.

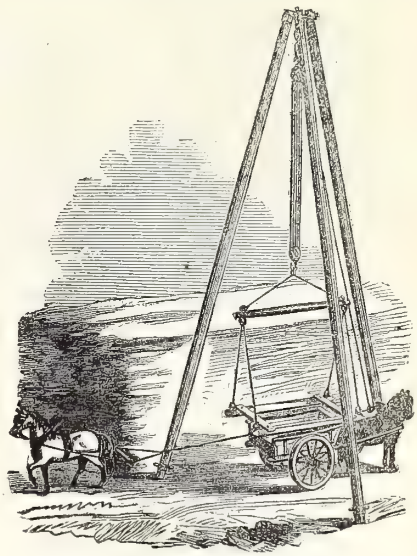
127. Patent Staple Beaters and Concave, for Thrashing Machines; T. W. Ashby and Co., Rutland-terrace Iron Works, Stamford, Lincolnshire.



These beaters are constructed of a series of wrought iron bows or staples fixed diagonally in wrought plates. The advantages of these beaters are said to be as follows:—1st, The staples, having a round surface, rub out the corn without the least danger of breaking, or in any way injuring the kernel. 2nd, The hollow under the staple affords the corn space to fall through instead of its having to pass over the beating edge. 3rd, The staple-beaters being open allow a current of air to pass freely through them when at work, thus the resistance to the atmosphere is lessened, and the blast being reduced, less power is required to drive them. 4th, These beaters have a double action, both sides being alike; when one side is worn, the drum can be taken out and reversed; the beaters then work again the same as new. 5th, Being made entirely of wrought-iron, they are remarkably strong and durable. The concave is perforated, and made to match the beaters. The corn is driven through the open spaces where it is rubbed out. It does not damage the corn or the straw.

128. Patent Hay and Corn Lift; Archibald White, Great Missenden, Bucks.

By this lift the horse or horses bringing the load to the rick raise it, and it is suspended by the side, and with its bottom level with the then top of the rick, thus making all the pitching from the load to the rick down and underhand. The lift consists of a tripod of poles 45 feet high, with pulley tackle suspended from under its top, terminating in a stretcher and slings, which slings are attached to the four corners of a frame in a cart or waggon, and the frame taken up with the load, or to a lifting piece passed under the front of the body of the cart or waggon, and another at the back, when the frame is dispensed with, and the body of the cart or waggon, without the wheels, axles, or carriage, taken up with the load. The tripod is easily raised by a horse, and when placed on the little carriages, and the stretchers placed be-



ween its legs, may be moved while up from rick to rick. It is also easily lowered by two men. Beyond making all the unloading underhand, the usual mode of building ricks is not interfered with. By the use of the lift, ricks may be built double the height they usually are, and thus one bottom, one top, and one thatching be saved.

129. Patent Apparatus for Drying Hay, Corn, &c.; Archibald White.

The Apparatus consists of a building, or close chamber, about 70 feet long, 10 feet high, and 9 feet wide, having inside three tiers of rails, one above another, its entire length, and fans at one end to force in the current of cold air by which the drying is effected, and open at the other end, to allow the moist air to escape; the hay, &c., is placed on shallow carriages, formed of open wooden frames, covered with wire netting and running on the rails, so that it is exposed on all sides to the current of air; along the entire length of the chamber is a shed, under cover of which the carriages containing the hay, &c., to be dried are put into the close chamber through its side openings, taken out to be turned, and finally taken out for removal to the stack. Gravity is made to cause the carriages to pass from the open end of the chamber to the fans, and to cause them to pass into and out of the close chambers On each tier of rails are seven carriages; when one next the fans with its dried contents is removed, the other six on that tier pass, by gravity, one carriage width nearer the fans, and the other carriage laden with wet hay is placed on those rails at the open end; the opening to the shed through which the carriages pass have sliding doors, which are kept closed, except when the carriages are passing in or out. It is calculated that at least two waggon loads of hay or corn may, by this apparatus, be dried per hour. The fans may be turned by steam or by horse

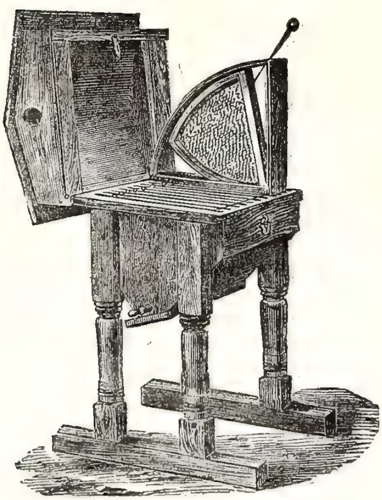
power, or by a sufficient weight run up by lifting tackle under a high tripod, and acting in its descent as a weight acts in turning a spit when roasting. The apparatus may be a building of itself, or be put up in a barn, in which case the roof and open shed may be dispensed with, and the cost would be reduced about one-half.

130. Hancock's Patent Butter Machine; Andrew M'Laren and Co., 174, Upper Thames-street, E.C.

This machine is for purifying butter from acid and buttermilk, and also for cooling it in warm weather, without touching it with the hand. The butter is taken from the churn and placed in a cylinder, and pressed with a screw piston trough a perforated plate at the bottom of the cylinder, with a tub of cold water. This operation may be repeated, and the butter will be thereby chilled and purified in the hottest weather. Butter having been thus treated will keep good much longer than when it is worked by the hand, as the heat of the hand imparts a greasy character to the butter, which militates much against its keeping quality, even if the hand could extract the buttermilk from the butter as well as this process.

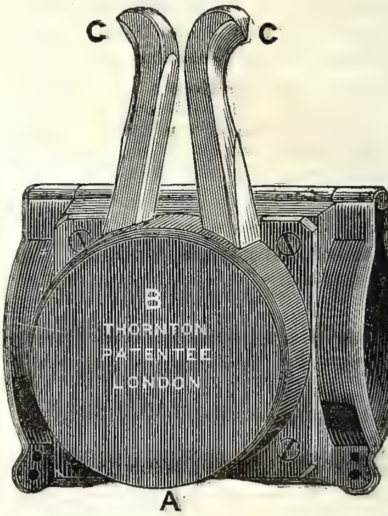
131. Major Munn's Bar-Frame Bee-Hive; W. J. Pettitt, Dover.

In this hive each comb can be lifted out and examined without interfering with any other part of the hive, or occasioning the loss of a single bee. The whole of the interior of the hive is open to inspection at any moment, and a choice can be made of the combs containing the most



honey; or the apiarian is enabled to trace the devastation of the wax-moth, and ascertain the presence of any other enemy, without the assistance of any fumigation whatever. The Ligurian queens can be introduced into this hive without difficulty, the glass observation frame affording the necessary protection to the most timid operator.

132. Patent Rein Holder; E. M. Thornton, 6, Brooke-street, E.C.



This is a clip for securing the reins when out of the driver's hands, preventing them falling to the ground, or getting entangled in the horse's heels. It can be turned down below the level of the dash board when not in use.

133. Patent Mica Garden Labels; Frederick Leiss, 31, Queen-square, Bloomsbury, W.C.

These labels are manufactured of the mineral mica, in transparent laminæ. The inscriptions being between sheets of this substance, and so protected, stand all degrees of heat, cold, or humidity.

134. Patent Gravity Potatoe Selector; James Anderson, 92, Farringdon-street, E.C.

The finest, mealiest, and most nutritious potatoes are always denser and heavier than the soft and waxy. By taking advantage of this difference in their specific gravity, the light and inferior potatoes are made to swim on the surface of a solution of salt, while the heavy and good sink to the bottom. By this contrivance, the dry and mealy potatoes are separated. In order to classify potatoes into three qualities, good, medium and inferior, let a solution having a specific gravity of 1·100 be put into one jar and a solution having a specific gravity of 1·080 into another. Very good potatoes only will sink in the first jar; the medium and inferior will remain floating on the surface. Let these be removed to the second jar, containing the solution of the lowest density; the medium quality will sink in it, while the inferior will remain floating on the surface.

BUILDING AND DOMESTIC APPLIANCES.

(*For the Remainder of the Articles in this Section, see Drawings.*)

139. Ornamental Tiles; Maw and Co., Benthall Works, Broseley, Salop.

140. Artificial Stone, Building Bricks, &c.; Caroline Paine, Dippenhall Silica Works, Farnham, Surrey.

These imitations of Bath stone, bricks, and bracket, are all made of the building material, "Soluble Silica," which is stated to be more durable than natural stone, and less costly. It can be made of any colour.

141. Patent Circular Brick, Tile, or Pottery Oven; Wm. Basford, Patent Face Brick and Floor Tile Works, Burslem, Staffordshire.

The improvement in this oven consists in forming the mouths and fire draughts to back and front, and one fire-draught across the centre of the oven; thus it becomes a better conductor of heat, and larger ovens may be used, with less damage to the goods, than where the mouths are at equal distances all round. These ovens are adapted to burn red floor tiles or pottery ware.

142. Patent Oblong Kiln; W. Basford.

The improvement in this kiln consists in forming chambers along each side of the kiln, leaving space along the middle of the kiln to wheel bricks or tiles along to fill the chambers. These chambers are formed from three to four feet high, and the middle of the kiln is fitted in the ordinary way with chequered bricks.

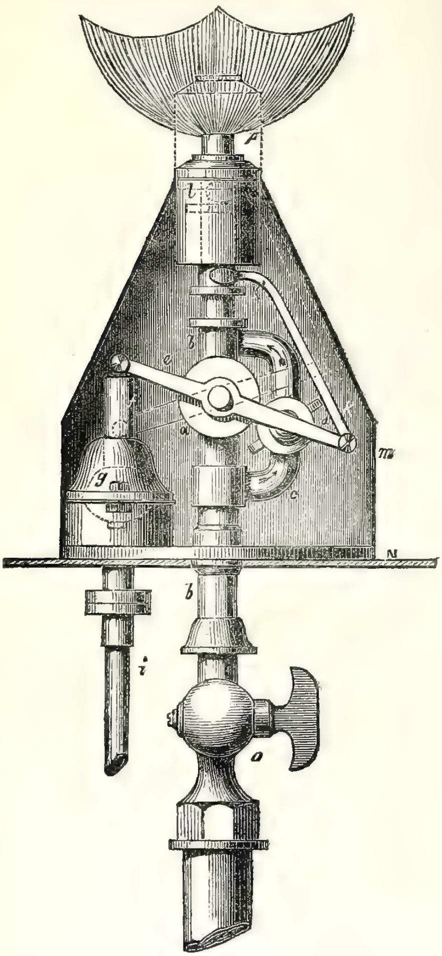
143. Patent Method of Sheet Roofing with Slate; Rev. Thomas Martin, Summerton, Little Newcastle, Pembrokeshire.

This roof, in its commencement, is formed with ordinary rafters; across these rafters battens are nailed down at such distances apart as will suit the sizes of the slate employed. The battens for ordinary roofs are made from three to four inches broad, and when using the size of slate known as duchesses, those battens are placed so that the distance from the centre of the one to the centre of the other will be one foot. If the size known as countesses is used, the distance from centre to centre will be 10 inches, and so on for the various sizes of slates in use. The slates must be prepared with square edges to make good clean butt joints. The rafters having been overlaid with battens, suitably arranged for the size of the slate to be employed (say duchesses), the roof is covered in the following manner:—To form the first ascending line so many slates are divided lengthwise as will suffice to extend that line from the eaves to the ridge, and thereby are produced pieces six inches in width and two feet in length. With these pieces the extreme edge of the roof is covered, fastening down the slates to the batten by nails or screws, and the narrow ascending line is thus formed. This arrangement is necessary to effect a bond when the second layer of slate is put on. When the narrow ascending line is completed, succeeding lines of undivided slates are next placed upon the battens, and nailed or screwed down side by side, so as to form the lines 1, 2, 3, 4, 5, 6, each slate of which abuts against that placed above it, so as to make a butt joint therewith in the centre of the batten. A sufficient area having been covered with slates, the next process is to apply to the covering surface an adhesive waterproof cement. While this coating is still soft, the second layer of slates is applied, and, to ensure a good bonding, a lateral line of the duchess slate is formed, which will be one foot in width, the lower part of that line being nailed to the first batten, and the upper part of it nailed to the middle of the centre batten, the upper part of the middle batten receiving the lower part of the next ascending slate, which will then be abutted against the upper part of the longitudinal slate, the top of which has been nailed down to the middle part of the second batten. Upon this principle butt joints will be formed through the whole of the lines, and consequently a continuous connecting sheet line will be produced to any indefinite distance. The slates forming the covering layer are fixed as before with nails or screws, which passing through holes pierced for the purpose in both layers of slates by drilling or otherwise, enter the intermediate battens, or those to which the underlying slates were not previously attached, joining by that mode the whole area in one vast connecting sheet. For the adhesive waterproof cement, Portland cemen is preferred.

144. Patent Safety and Indicating Atlas Sliding Chandelier; Richard Hugh Hughes, Atlas Works, Hatton-garden, E.C.

In these chandeliers the counterpoise or balance weight is in one circular piece (as a coronal) so that if one or even two chains break, it still remains the same height, the weight simply falling out of position, and should all the chains break simultaneously (a not very likely occurrence), the body and weight then fall upon a conical valve, and thus prevent any accident or escape of gas. Another advantage is that double the length of slide is obtained by these chandeliers; the light can be lowered nearer the table. An organ pipe is placed in the throat of the tube, so that immediately an escape of gas takes place it sounds a shrill whistle, which can be heard all over the house, thus indicating that more water is required in the tube.

145. Patent Gas Lamp Regulator; John Huggett, Eastbourne.

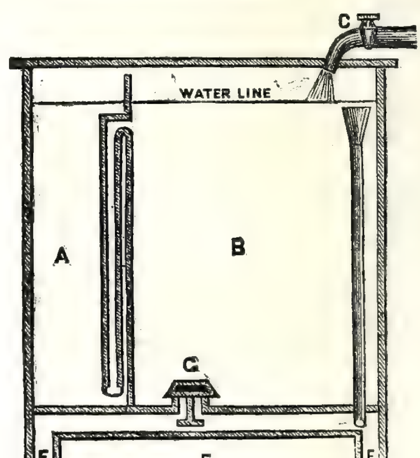


146. Patent Compensating Gas Meter; Frederick Hudson, 227, Blackfriars-road, S.

The chief object of this invention is the maintaining a constant water level in the measuring compartment of a gas meter, which is done by a series of troughs set in a zigzag arrangement, one above the other. The succeeding troughs being inclined to each other in such a manner that the lowest trough when caused to vibrate, shall deliver the water taken up by it into the end of the next above it, and so in succession as the series is caused constantly to vibrate to and fro, all excess of water beyond that necessary to keep up the constant level flows back to be again raised by the vibrating troughs. The series or combination of troughs, are put in motion by means of a crank or pin on the axis, usually employed to give motion to the registering apparatus of the meter. This crank pin is caused to act within an opening formed in the axis, on which the combined series of troughs is mounted, so that as the crank pin is caused to revolve, it alternately acts on the curved sides of the opening, and on the series of troughs in such a manner as to cause the troughs to incline first in one direction and then in the other. The extra supply of water as heretofore, is contained in a suitable compartment of the meter. One or more of the lower troughs is constantly in the water so long as the supply is not used up, and provision is made to stop the supply of gas to the meter by closing the supply valve as soon as the troughs have no water to lift, and this is accomplished by means of a cup attached to the supply valve, so that in this compensating meter the following improvements are said to be obtained on the ordinary wet meters, viz., a "constant" standard of measurement within the range of the new Act. The meter cannot be overcharged (as this would stop the supply of gas), and it prevents consumers supply of gas from being shut off for want of water, as the meter is provided with a reservoir that contains sufficient water to supply it for six months.

147. Moules' Patent Self-Acting, Cleansing, and Purifying Apparatus.—Exhibited by Job Mead and Co., Trolway Works, Bethnal-green, N.E.

The woodcuts represent a reservoir, consisting of two compartments, A and B; A, containing the disinfecting agent—the other, water, which is admitted and regulated at pleasure by the tap C, according to the number of actions required. When the water has risen to the proper height, it is charged with its required portion of the disinfecting agent, and enters the lower cistern E, in which is a float F, in connection with a large valve G, which, opening as the float F rises, emits an immediate rush of water, together with the disinfecting agent. Afterwards the cistern again fills, and re-empties as previously described. Thus, by regulating the inlet of water from the tap C, the operations will take place at any given interval of time, or the action may be entirely stopped when not required.

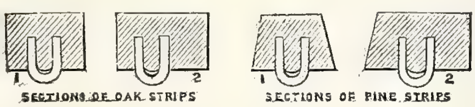


148. Carbonic Aerial Water and Air Purifier and Cooler; Joshua Jackson, 29, Queen-street, Wolverhampton.

This apparatus consists of a series of disks, fitted

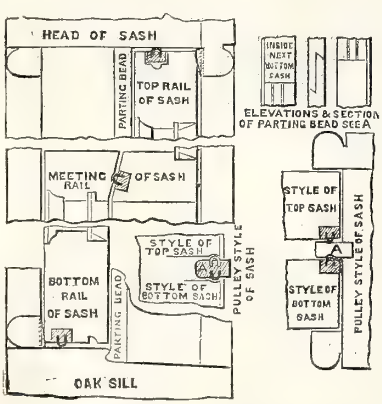
with pure wood charcoal, and arranged one above another (either suspended on chains or fixed on a stand) to the number of six, or more or less according to the requirement of the case. Above these disks is fixed a reservoir to hold the impure water This reservoir is usually a bell-shaped vessel, with a valve or tap at its convex end. Below the disks is a receiver, which is either a jug, pan, or tub, or else a vessel similar to the reservoir. Above the purifiers is a disk, called a filter, which is either placed between the purifiers and the reservoir, or inside the latter. When the valve or tap is opened in the reservoir, the impure water flows through the filter, which retains its mechanical impurities, and then through the whole series of purifiers (which absorb its gaseous impurities) until it falls into the receiver. While passing through the purifiers, the water is exposed to the cooling and refreshing action of the air, which gives the apparatus an advantage over an earthen or glass filter, which excludes the air. When this apparatus is suspended over a burning lamp, it absorbs the noxious gases arising from the combustion of the oil, gas, or spirits, and also any such gases that may be floating in the air, thus keeping the air in the apartment sweet and fresh. When the purifiers are saturated with impurities, they must be boiled in water for half-an-hour, which must be repeated, if necessary, until they become as pure and efficient as when new. This apparatus is peculiarly applicable to rain water.

149. Patent Cloth Padded Wood Strips, for rendering Window Sashes, &c., Air, Dust, and Water Tight; John Brown, Architect, Norwich.

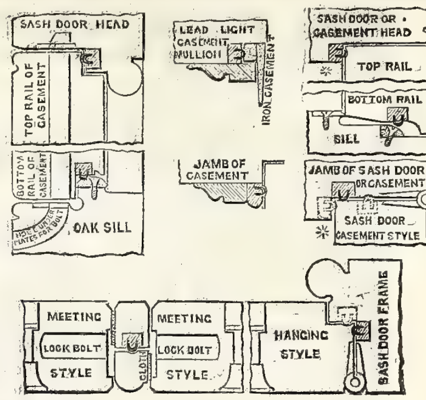


Full Size.

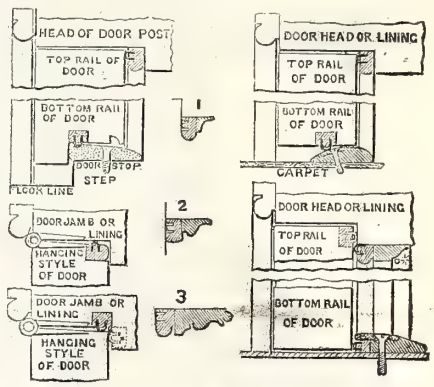
The plans and sections below (one-fourth full size) will explain the system of grooving or rebating the surfaces of work into which the patent cloth padded wood strips should be fixed, so as to secure the above desideratum. (See Drawing, No. 257.)



No 1 for Sashes of ordinary description.

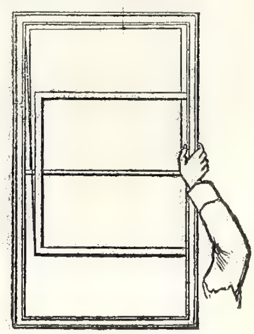


No. 2 for French Casements, Sash Doors, &c.



No. 3 for External and Internal Doors.

150. Patent Sash Frame; William Henry Elkin, 27, Belvedere-road, Lambeth, S.

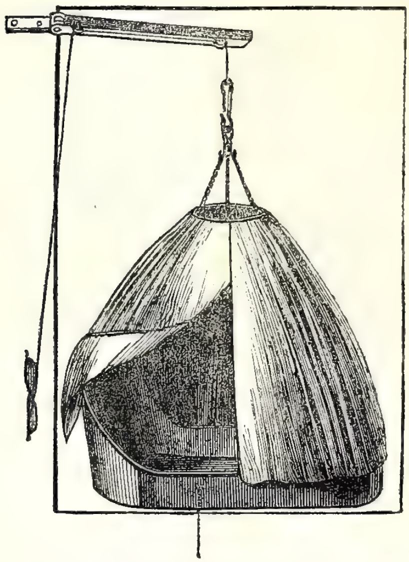


The improvement consists in that portion of the frame, called the pulley-style, being made loose instead of fixed; it is kept in its place by an elastic arrangement at each end, and the face of the pulley-style is thus made to press equally against the edge of the sash. The removal of the sash is effected by pressing it sideways against the elastic pulley style (as the cut represents), which yields sufficiently to allow the sash to be disengaged from the beads on the opposite side; the free side is then drawn inwards, and the other side of the sash liberated from the elastic style. The sash may then be turned inside out-

wards for cleaning, or the lines may be simply unhooked and the sash entirely disengaged. The pulley styles can then be lifted out of the frame to repair weights or lines.

151. Domestic Fire Escape; J. T. Pedder, 85, Murray-street, New North-road, Hoxton, N.

The apparatus consists of an iron hinge bracket which is tightly fixed into the wall of one of the upper rooms in the house at the top of the window. When out of use it is turned back against the wall inside the room, the rope being kept in a box made in the floor. When wanted for use the arm is swung out at the top of the window, the rope is then hooked on the chain. The steadying rope at the bottom of the chair is then to be passed into the street, for a bystander to gently draw the chair in its descent out of



reach of the fire for any person to get out of it when it reaches the ground. The felt curtains are then lifted up at the side facing the room, and the person gets in and is lowered by the rope which passes through the arm over the pulleys by any person in the room, or by passing the rope into the chair, and slipping it under the hook in the bottom, they can lower themselves, or by passing it into the street they can be lowered by the bystanders.

152. Safety Fire Escape, or Apparatus for Lowering and Raising Weights; Martin Deavin, Builder, 28, Crystal-terrace, Rotherhithe, S.E.

This apparatus is intended for private use, and is applied by dropping the grip inside the window, and the framework of the machine outside. Attached to this frame are pulleys and racks, so arranged as to prevent the object going down with too great momentum. The cage, by means of the balance weight at the end of the chain, is kept in position outside the window to receive the person, whose weight immediately sets the machine in motion, the velocity of which is scarcely accelerated, however great the descent. Immediately the cage is relieved of its weight, it ascends again.

153. Patent Incomparable Bed; F. Ayckbourn, 17, Bond-street, Vauxhall-cross, S.W.

This bed consists of a case, made of ordinary ticking, shaped like a mattrass, but divided internally into numerous separate cells or divisions. In each of these cells is placed a peculiarly constructed tube for holding air or water, either cold or heated to any required extent. The air-bag is larger somewhat than the cell in which it is placed, thereby rendering it incapable of bursting.

154. Relievo Coverings for Walls and Ceilings; White and Parlby, 49 and 50, Great Marylebone-street, W.

The basis of the material is plaster of Paris, which, combined with other ingredients, forms a compound inflexible mass perfectly dry, durable, and not liable to shrink or crack. It is especially adapted to large works in public or private buildings, in forming domed or wagon-headed ceilings, curved surfaces (however complex), coves, cornices, intersecting ribs and panels between ribs, together with all work of a like description, rendering plastering unnecessary where it is used.

155. Patent Equilibrium Chair; Angelo Sedley, 210, Regent-street, W

156. The Reception Rocking Chair; Frederick M. B. Bertram, 4, Gower-street North, Bedford-square, W.C.

The accompanying engravings will illustrate the invention. The lower frame of the chair is so arranged as to stand upon castors—not upon rockers—and the legs, instead of being placed in the usual manner at the four corners of the chair, are centrally placed at the front and back which makes the natural approach to it more convenient. The rocking motion is provided for by hinging the body of the chair to the underwork upon journals placed at the sides, and the motion is regulated by two spiral springs placed at the front and back. These springs are placed inside the front and back legs of the chair, and are entirely concealed from view, as are also the journals or axes upon which the chair vibrates. In the engravings—

Fig. 1.

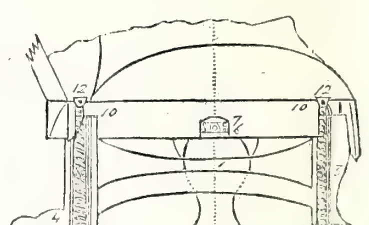


Fig. 2.

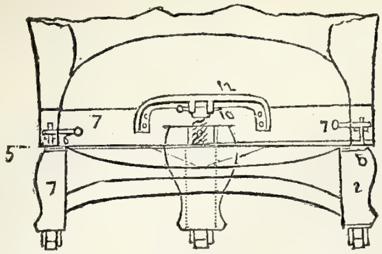
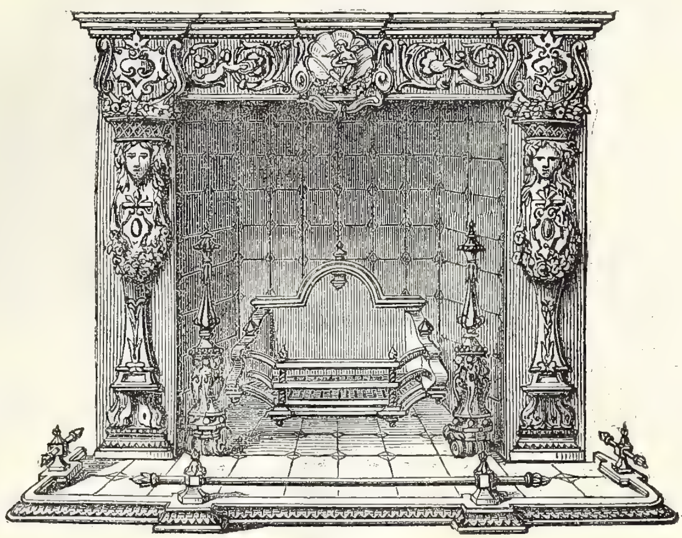


Fig. 1 is a central section from front to back, and Fig. 2, is a section through the centre of the axis upon which the chair vibrates; 1, 2, 3, 4, are the legs of the chair; 5, 5, are the caps of the legs of which the tenons, 6, form a part. These fit into mortices, 7, in the body of the chair, or in irons attached to it. 8 and 9 are spiral springs, which regulate the rocking motion of the chair; 10 and 11 are the fastenings at the ends of these springs; 12 is a bar to which the rear spring is secured at the top. The chair may be fixed at any angle by means of a grooved stationary plate, 13, attached to the back leg of the chair, and the bolt, 14, which is secured to the seat frame. This allows the occupant to recline in any desired position.

157. Majolica Chimney Piece and improved Fire Grate; exhibited by Thomas Goode and Co., South Audley-street, W.



This chimney-piece was manufactured by Messrs. Minton and Co., and is the first produced in this country. The fire grate is for wood or coal, and has a fire clay back and electro-bronze fire-dogs. It was designed and manufactured by D. O. Boyd, 9, Conduit-street, W.

158. Patent Heat Regulator; C. Varley, 7, York-place, Kentish-town, N.W.

The object of this apparatus is to ensure any desired uniform temperature in ferneries, forcing-houses, greenhouses, or any chamber heated by gas. There is a tube to the upper end of which is attached a chamber, composed of a series of tubes, to increase its surface. The other end of the tube is bent into a U, and has a small chamber, with a stuffing-box attached to it; the lower portion of this tube is filled with mercury; the remaining portion of the longer limb of the tube and chamber is filled generally with spirits of wine; there is a smaller tube sliding through the stuffing-box into the larger tube, with a fluid joint, to allow of the motion of the smaller tube. The gas flows from the main through the small tube into the larger one, and out between the two tubes, and thence on to the burners which heat the chamber. As the temperature of the chamber rises, the fluid contained in the larger tube and in the chamber expands, raising the mercury; and when it has raised it to a certain degree, the mercury closes the mouth of the smaller tube, and cuts off the gas. On the temperature falling, the mouth of the smaller tube is unclosed, and the gas turned on. A small burner, in direct connection with the main, is kept constantly burning, to re-light the gas when turned on, or it can be arranged that the flow of gas is only lessened, and never turned off. There is a graduated scale, over which an index attached to the small tube slides, and by sliding this tube up or down, the temperature is determined at which the gas shall be turned on and cut off. There is a modification of this apparatus, where, instead of sliding the small tube nearer or further from the surface of the mercury, the adjustment to the desired temperature is obtained by raising or lowering the mercury which forms the valve nearer or further from the mouth of this tube, by means of a plunger worked with a rack and pinion. By this arrangement all stuffing-boxes and moveable joints are avoided. The apparatus is made entirely of iron, and as there is nothing to get out of order, there is no possibility of derangement. Modifications of this apparatus are used to control the temperature of chambers heated by other means, and they are made of various sizes, according to the purpose for which they are applied.

159. Baker's Oven; Samuel Terrill, Redruth, Cornwall.

This oven is placed over the fire; between the fire and oven there is a brick slab, seven or eight inches thick, to protect the bottom of the oven from the fire. The flues have seven divisions —three on each side of the fire, which are under the oven, and one at the back. A second oven is placed over the first at the distance of several inches, which division forms a flue between the two ovens. This flue is divided on each side by a plate of iron, which carries the heated air between the upper surface of the first oven and the under surface of the dividing-plate; this air is then carried between the upper surface of the dividing-plate and the bottom of the second oven, then by the sides and over the top of the second oven. The two ovens and all the flues are governed by two dampers at the top; one of the dampers being near the front and the other near the back. By this invention it is stated that half of the coals usually required in the ordinary public ovens may be saved. There is no dirt produced in the oven; the cooking is done thoroughly, and with the saving of a considerable degree of labour. Whenever desired, the second oven may be dispensed with, without detracting in the least from the efficiency of the first.

160. Economic Stoves; Dressel & Levestamm, 463, New Oxford-street, W.

161. Patent Chimney Bar; Frederick Edwards and Son, 49, Great Marlborough-street, Regent-street, W.

This is intended to give a contracted form to the openings of chimnies, and renders a chimney more simple of construction. By giving a contracted opening to the chimney, it improves the draft and leaves no space for the lodgment of soot. The specimen shown has an improved register door attached to it, but this is not a part of the invention.

162. Ventilating Hearth-Plate; Frederick Edwards and Son.

This is intended to afford a supply of fresh air into rooms, and for preventing drafts. This plate is intended to occupy the place of the back stone hearth in fire-places. It is provided with a hollow chamber, into which a current of fresh air is introduced from an external wall. The air, passing under the warm hearth-plate, enters the room through the sliding ventilator under the fender. It thus insures a proper supply of air to a fire and prevents drafts from doors and windows. The ventilator can be closed whenever desired.

163. Patent Chimney Top; James Darrant and Noel A. Harris, 14, Little Howland-street, W.

The improvements in this chimney top are, firstly, that by a series of corrugated cells, it catches the wind and carries it in an upward direction, thereby causing a great current of air, which draws the smoke away with it; secondly, it is open at the top, thereby allowing the sweep's brush to pass through, while most tops are capped over; thirdly, by its construction, it entirely prevents all down-draughts; fourthly, it can be readily fixed, as it requires no brickwork. The one shown in the engraving has a square bottom, for brickwork, which is only necessary where no earthenware pot has been previously fixed. Fifthly, it has no rotary motion.

164. Registered Perforated Chimney Pot; James Boyd, Hither-green, Lewisham, S.E.

This chimney-pot has perforations running in a spiral direction round it, so that (from whatever quarter the wind blows) it is stated by the inventor that an increased upward current is secured, and the possibility of down-draught overcome.

165. White's Patent Hydro-Fan; E. Weir, 142, High Holborn, W.C.

This apparatus is for the purpose of purifying, moving, and changing the temperature of air in enclosed places. The purpose is accomplished by forcing the air to be acted on into contact with water. In form, A, of the hydrofan, this is effected by filling the lower part of the machine with water, and by turning the handle, which turns a fanner enclosed in a case, when the air will be drawn through the upper half of a perforated disc of metal, which is kept wet by revolution in the water, and will be forced out of the fan case. In form B, it is effected by the force of gravity of water turning a Barker's mill, on the arms of which a fanner is fixed, and by which fanner the air is drawn through perforated metal, over which the water from the Barker's mill is trickling. In form C, the force and action are similar to those of form B, but the force is obtained by filling the upper vessel with water by pumping it up from the lower.

166. Boy and Shell Metal Drinking Fountain, designed by John Bell; manufactured by the Coalbrookdale Iron Company, Colebrookdale, Shropshire.

167. Marble Waterlily Drinking Fountain, designed by John Bell; Cheesewring Granite Company, 54, Old Broad-street, E.C.

168. Marble Victoria Regia Drinking Fountain, designed by John Bell; Cheesewring Granite Company.

These designs are also executed in granite.

169. Patent Glass Casks; Hubart and Cantillon, of Liège, Belgium. Exhibited by L. de Fontaine Moreau, 4, South-street, Finsbury, E.C.

These casks are blown in moulds.

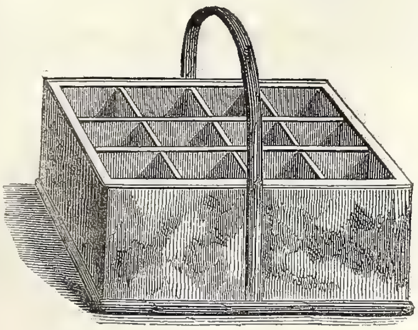
170. Patent Self-acting Valve for Preserving Empty Casks from Mould, by Excluding the Air; George Leslie, Upper Mall, Hammersmith, W.

This apparatus consists of three pieces of vulcanised india-rubber, with slits cut in their centres about two-thirds of their diameter. These pieces

are laid one behind another, the slits being placed at right angles with each other, and secured with a tinned iron, or an ebonite frame. The action is shown by thrusting the spigot affixed to the model through the top hole and valve; it is then open, and the contents could be drawn off. On the withdrawal of the spigot the valve closes. This can be applied to any other holes in casks.

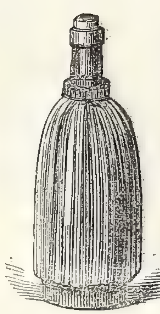
171. Patent Packing Cases or Boxes for Holding Bottles, &c.; A. B. Seithen, 6, Alpha-place East, Caledonian-road, King's-cross, N.

This invention consists in the construction of baskets made of cork instead of cane or wicker,



for the transport of wine, &c., and plants which are breakable or likely to suffer from damp. In case of an accident or damage, these baskets can easily be repaired.

172. Improved Envelopes for Bottles; A. B Seithen.



These improvements consist in leaving the necks of the bottles partly uncovered, and they take, consequently, less room. They prevent the shifting of the bottles, and thereby ensure greater safety in the transport.

173. Improved Manufacture of Cork Stoppers; A. B. Seithen.

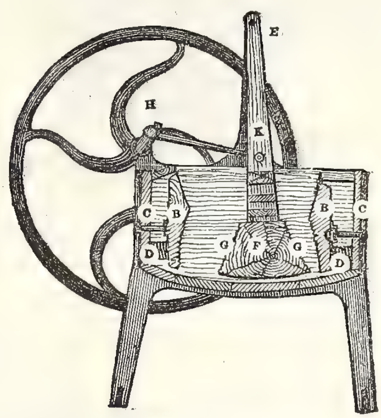
The novelty consists in that the corks, instead of being cut, are ground, which gives them any desirable shape, a much smoother surface, with less waste in the material.

174. Improved Artificial Corks; A. B. Seithen.

The corkwood is cut into fine veneers, and rolled up to the desired size, the end being cemented, thereby producing, from thin wood, large and stout stoppers, of an even elasticity and porous substance, while those cut by hand have a good and a bad side according to the different growth of the material employed.

175. Patent Washing Machine, combined with Wringing and Mangling Machine; W. Williamson, 133, High Holborn, W.C.

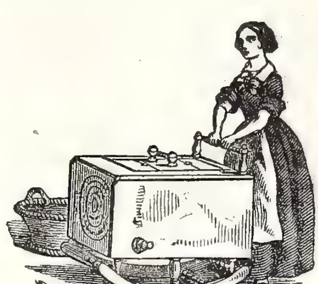
The mode of action is to form the linen, &c. into a roll, and to squeeze it against an elastic washboard (or against two elastic washboards in the double action machines), and at every stroke to cause the roll of linen, &c., to move round, so that its position is changed about fifty times per minute. The small machines are worked by lever motion; large machines by crank motion and flywheel.



176. Patent Washing Machine, (with Wringing, &c. combined); Thos. Bradford, Cathedral-steps, Manchester, and 62, Fleet-street, E.C.

This machine has an improved lid, or "Blueing Trough," by which an economy of time and labour is effected.

178. Universal Washing, Wringing, and Mangling Machine; Edward Weir, 142, High Holborn, W.C.

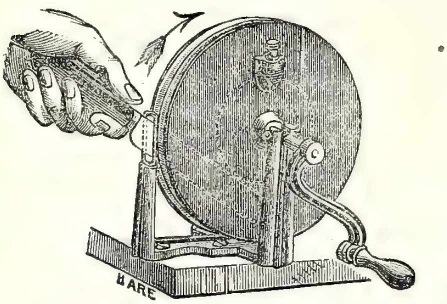


179. Saunders' Patent Cooking Range; Exhibited by Thomas Bradford, 62, Fleet-street.

In this range meat may be roasted before an open fire in the oven; for this purpose a sliding side nearest the fire-place draws out, and the fire radiates directly into the oven. Another feature of the range is, it is all encased and requires little fixing.

180. Patent Self-Adjusting Carpet Sweeper; Newton Wilson, and Co, 144, High Holborn, W.C.

181. Registered Knife Cleaner; S. and E. Ransome and Co., 31, Essex-street, Strand, W.C.



This machine conists of a pair of elastic revolving plates, supported by iron backs, working in a frame, and so arranged that the knives receive friction between them.

182. Patent Star Polish; Black Lead Company, 29, St. John-street, Clerkenwell, E.C.

This polish is intended for cleaning and polishing glass, plate, Britannia metal, &c.

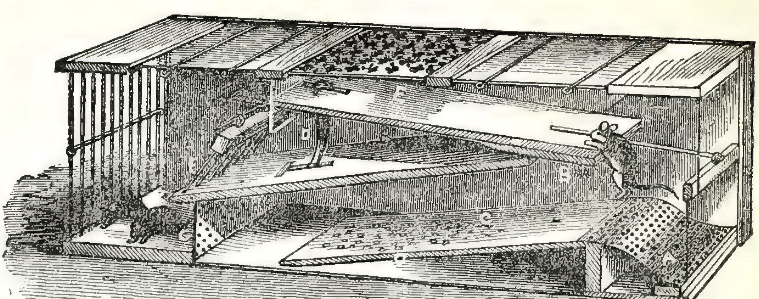
183. Improved Triangular Fire-Lighters and Revivers; S. and E. Ransome and Co., 31, Essex-street, Strand, W.C.

184. Steane and Palling's Patent Apparatus for Preventing Candles from Dropping or Guttering; Exhibited by John Gedge and Son, 11, Wellington-street, Strand, W.C.

This apparatus consists of a small metal tube with projecting arms, and a metal or porcelain cap. The tube is first passed over the wick of a candle, and afterwards the cap, which rests npon the arms of the tube supported by the candle; as the candle burns the tube becomes heated, and forms a well of fluid tallow or composition near the wick, and the weight of the cap resting upon the arms of the tube, it descends with it as the candle burns. The result is, that the outer circumference of the candle forms a border, over which the tallow will not run, even if the candle be moved rapidly from place to place, and the cap prevents the flame overlapping on to and guttering the candle.

185. Patent Double Cheval Glass; Brown and Co., Manor-place, Upper Holloway, N.

186. Colin Pullinger's Registered Automaton Mouse Trap; S. and E. Ransome and Co., 31, Essex-street, Strand, W.C.



The peculiar feature of this trap is that it is reset by every mouse caught in it. The engraving represents a perspective view of the apparatus, the side being removed to exhibit the construction of the interior. A is a box covered with perforated zinc, and which contains seed. The mouse is supposed to smell this seed, but as he cannot get it, he endeavours to reach the bait B, which is a wire cylinder filled with lard. In doing so, he must step on the treadle C, and his weight overbalancing it, releases the trigger D from the catch, which throws the trap, and the mouse is caught as represented in the engraving. As there is no escape at the entrance, the mouse climbs upon the balance board E, and being attracted to the opposite end by the zinc grating at the top, the balance board descends by his weight, which raises the door, connects the trigger D to the catch, and the trap is re-set. The animal, finding the opening through which it got on the balance board again closed, pushes its way to the chamber G, through the wire door F, which falls when he has passed, and finally secures him.

MISCELLANEA.

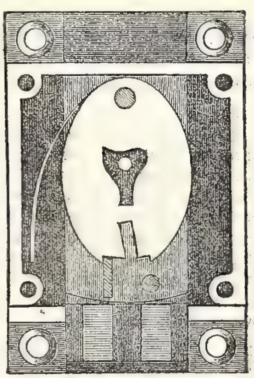
(*For the remainder of the articles in this Section, see Drawings.*)

200. Patent Fire, Gunpowder, and Thief-proof Safe; Chatwood and Dawes, Liver Safe Works, Bolton, Lancashire, and Ferrabee and Co., 75 and 76A, High Holborn, W.C.

This safe is constructed on the principle of the safety valve, so as to allow the gases of exploded gunpowder to escape without doing it the slightest injury. The peculiar arrangement necessary to carry out the patent is stated to render this safe much stronger than safes made in the ordinary way.

201. Double Patent "Ne Plus Ultra" Lock; George Price, Cleveland Safe Works, Wolverhampton.

This lock, as constructed for the doors of iron safes, is a lever lock, and the levers (six, seven, or eight, as the case may be) are of an oval shape, and have their centre of motion at the end, the same as in all ordinary lever and tumbler locks. The slot for the entrance of the "main stump" is at the other end, the same as in the "Ruxton lever." In the centre of the levers, "safety plate,"



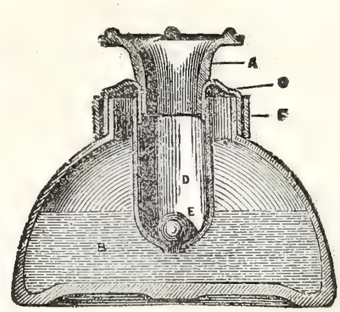
and bolt, is formed the open space, and in this open space is placed the drill-pin, upon which the key performs one-third only of a revolution in locking or unlocking. The edges of the levers inside the open space are all in the same plane. The space around the "drill-pin" being thus enclosed, it follows that in the operation of locking or unlocking, this space must travel with the key, and, consequently, remains the same in area. From this circumstance, no second instrument or pick can be put into the lock, as if any one of the levers be moved, the keyhole is thereby closed against the admission of anything else. As there is not the slightest communication between this open space and the space outside the levers, no gunpowder can be forced, even by hammering it, into any other portion of the lock. The cavity for the reception of gunpowder being reduced to the smallest possible space for the reception of the key and its action, and less than two dwts. being the most that can by any means be forced into it, added to the general strength of all the parts forming the complete lock, renders it capable of sustaining any number of explosions without the least liability to injury, except from the dirt left in the lock after each explosion. Between this and other lever and tumbler locks there is this difference, that whilst in the latter the levers can be pushed back by ramming the powder home, thereby considerably increasing the space for its reception, in this lock the cavity cannot be enlarged by any means whatever. The bolt is double-headed. The three apertures or channels in the head of the bolt serve the important purpose of letting out the gas, produced from the explosion of the gunpowder, into the large lock or bolt-chamber, so that in fact, the force of the discharge becomes altogether inoperative. There are also a number of holes in the bottom rim of the "lock-chamber" through which, again, the force loses itself.

202. Patent Secure Bullion Boxes; Job Mead and Co., Trolway Works, Bethnal-green, N.E.

These boxes are so constructed as not to be capable of being opened when once closed except by the entire destruction of them.

203. Patent Improved Inkstand; John Wilkins, 18, Essex-street, St. Peter's, Islington, N.

This invention has for its object the preservation of ink from dust and evaporation; a large and permanent supply in the reservoir; a facility of producing a supply for a day's use by the construction of a flexible circular hinge of vulcanised



India-rubber, so that the ink is forced upwards into a small reservoir or tube, and when required it is again forced back into the reservoir, and reserved for use in a clear, fluid condition. The neck of this flexible hinge is inverted, and a gutta-percha cup, A, is pressed into it; over this neck is forced a gutta-percha tube, D, which

forms a wide and air-tight joint, and in order to completely protect the ink, a gutta-percha ball, E, is introduced into the tube, which ascends and descends with the ink; and when the ink descends, the ball falls over the small aperture and excludes the air. B represents a glass ink reservoir, which may be of any size, and of any design, having a neck with an orifice of moderate diameter. The circular flexible hinge fits tightly round the neck of this reservoir, as shown by section C, thereby forming a perfect air-chamber. A metal ring surrounds the neck, as shown by section F. When the cup, A, is pressed downwards, the flexible hinge carries with it the small reservoir, D; the ink ascends, and the cup remains down as long as it may be required. When the cup is lifted upwards, the ink will descend, and is reserved for further use, in a clear and flowing condition. (See drawing, No. 259.)

204. Patent Ledger Indicator; John W. Wallis, 127, Fenchurch-street, E.C.

In this index the entire alphabet is always presented prominently before the eye, whether the book be closed or open; hence the labour of reference is lessened. It consists of a number of projecting tabs falling immediately opposite the letters required, which act as levers of reference, and protect the letters from being soiled. They are so constructed that the leaves do not tear and cannot curl up. It can be adapted to any book in use, at a trifling cost.

205. Patent Brief-Clip; Henry and William Earle, Hereford.

This clip consists of three fangs, cut from the centre of a triangular piece of metal, which fangs, turned up, form a stem; a hole is punched in the corner of the papers to be attached, the stem inserted, a small washer placed thereon, and the fangs turned back with the fingers. The triangular surface of the clip forms a good protection to the upper corner of the documents.

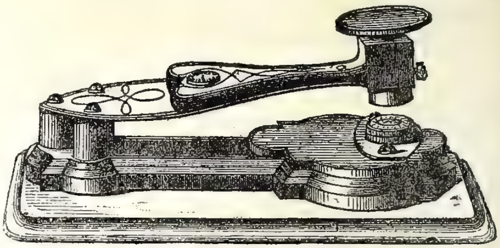
206. Patent Deed-Seal; Henry and William Earle.

This seal for parchment documents, on the principle of the above clip, consists of a circular metallic rim, inclosing a green "ferret" disc, and is attached to the turn-up of the deed in the same manner as the "clip," but the washer is dispensed with. Either an adhesive wafer or wax seal may be used.

207. Specimens showing a New Method of Staining Designs on Leather, for Bookbinding, Picture Frames, Upholstery, &c.; Charles Tuckett, jun., British Museum, W.C.

208. Patent Spring Lever Embossing Press; T. R. Pinches and Co., 27, Oxendon-street, and 14, Lisle-street, W.

This press is adapted for stamping both envelopes and note-paper, without removing the die. The chief improvement consists in its having no hinge or pivot, and thus it cannot easily get out of repair, even by constant use.



209. Patent Perforated Newspapers; James Boyd, Hither-green, Lewisham, S.E.

The intention is to facilitate the separation of the pages of newspapers and other publications by an arrangement similar to that employed for postage-stamps.

210. Improved Selvage for Cloth; Charles Berck Hervé, Belgium.—Exhibited by L. de Fontaine Moreau, 4, South-street, Finsbury, E.C.

This invention consists in employing for the manufacture of the selvages of woollen and other fabrics a thread of cotton, flax, or other vegetable textile substance, combined with a thread of hair of any kind, and twisted together; or, in lieu thereof, a thread of cotton, flax, or other vegetable textile substance, with a thread of wool twisted with it. The selvage is made by the ordinary means.

211. Improvements in the Preparation of Stuffs in General; Julien Weerts, Verviers, Belgium.—Exhibited by L. de Fontaine Moreau.

These improvements relate to giving to stuffs or fabrics made wholly of wool, and partly of wool and partly of cotton, or partly of wool and partly of silk, and to fulled and milled cloths and woollen fabrics in general, more suppleness or pliability, and to make them more soft, clean, and bright in colour than hitherto, and consists in submitting the said fabrics to the action of a dressing machine, in which the dressing rollers are covered with sand, emery, powdered glass, or stone, iron or steel filings or any similar suitable polishing substance. The employment of this method of dressing produces on the cloth or fabric the effect of brushing as obtained by the brushing machine.

212. Arnold's Patent Machine-Made Ruffles or Frills; J. H. Johnson, 47, Lincoln's-Inn-Fields, W.C.; Wight and Co., Friday-street, E.C.

These Ruffles or Frills, intended for trimming ladies or children's garments, &c., are made entirely in a sewing machine, suitably adapted for the purpose. The gathered fabric is drawn up into plaits or gathers and stitched on to the plain band or fabric at one operation, the same series of stitches sewing both to hold the gathers together, and unite them to the band. For description of the mechanism employed, see *Practical Mechanics' Journal*, vol. 5, New Series, page 198.

213. Patent Plastic Leather; R. Seager and Co., Ipswich.

This is a compound of leather, india-rubber, and gutta-percha. Leather shreads are submitted to an alkaline solution under gentle heat, until reduced to a fibrous condition; they are then rubbed through a wire cylinder; the fibre so obtained is then placed in a masticator with gutta-percha, india-rubber, or a mixture of both, the proportions being according to the texture of the material required; if pliable, more india-rubber; if hard, more leather; the pliable material is adapted for shoe bottoms, being damp-proof, and stated to be more durable, and less expensive than common leather. That which is hard and rigid is adapted for picture frames, and other ornamental designs, either plain, bronzed, or gilt, as shown by the specimens exhibited; its colour may be so blended as to resemble wood carvings.

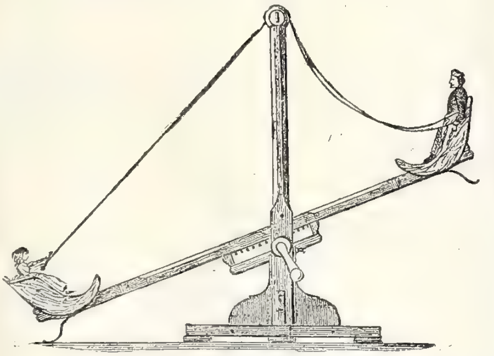
214. Boots with moulded bottoms of Plastic Leather; R. Seager and Co.

215. Boots moulded with Gutta Percha bottoms R. Seager and Co.

These boots are moulded on the uppers without being stitched, by R. Seager and Co.'s patent shoe clamps.

216. Patent Fancy Hair Brushes; Richard John Cole, 11, Pembridge-gardens, Bayswater, W.

217. Patent Gymnastic Invigorator, or See-Saw; Martin Deavin, 28, Crystal-terrace, Rotherhithe, S.E.



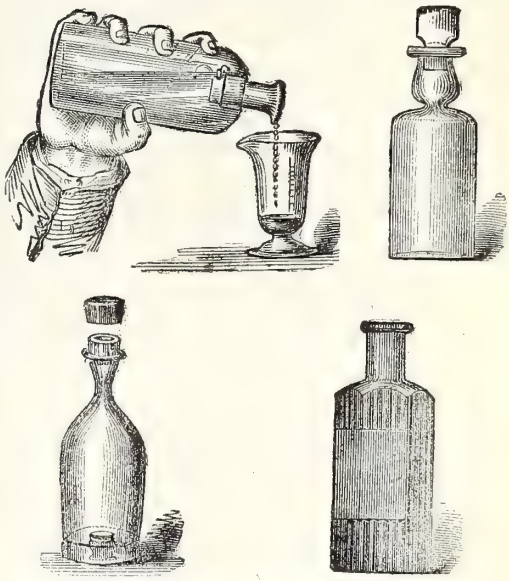
This invention consists in adjusting the ordinary see-saw on its fulcrum, by means of racks and pinions, so as to equalise the various weights of children, who work it themselves by means of cords attached to the perpendicular central stand. It has secure seats at either end.

218. Patent Email Letters and Ornaments; C. A. Schneider, 31, Queen's-square, Bloomsbury, W.C.

These letters, &c., are manufactured of a composition of waterproof materials, rendered unalterable by chemical processes. They have the advantage of combining, with a brilliant appearance by day, a perfect transparency by night.

219. Safety Medicine Bottles; William Toogood, 37, Mount-street, Grosvenor-square, W.

These bottles are made with contracted necks, so as to allow the fluid to flow in drops; some of



them have their necks ground in and moveable for filling, others have an opening at the bottom, for filling, which is closed by a cork, while others are made of dark coloured glass, with fluted sides.

220. Patent Seltzine Apparatus for Facilitating the Manufacture of Soda, Seltzer, or other Gaseous Waters; James Boyd, Hither-green, Lewisham, S.E.

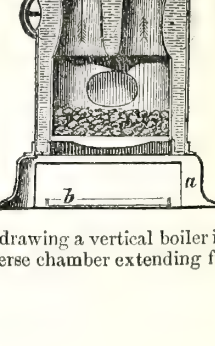
221. Self-acting Sieve, for the Use of Cooks, Bakers, Grocers, &c.; George Warriner, 38, Finsbury-square, E.C.

DRAWINGS.

230. Patent Improved Steam, Water, and other Fluid Gauges; Pullan and Creswell, Surrey Iron Works, Blackfriars, S.

Figs. 1 and 2 represent the improved double flat glass water gauge, the back glass acting as reflector, with self-cleansing cock at the bottom, and screw valve at the top. Figs. 3 and 4 show flat glass universal water gauge, and the improved mode of shutting off the steam, and all communication with the boiler, by one movement, and also for blowing the gauge through for testing whether it is in working order. This also has a reflector in the back for showing the height of water in the gauge. Figs 5 and 6 show the double reflecting flat glass water gauge, with the improved double-coned screwed valve, for shutting off the steam and testing the gauge and screw valve at the top. Fig. 7 shows an improved double flat glass reflecting water-gauge, arranged as a duplex gauge, so that at any time one gauge can be tested against the other to see whether they work accurately or no; and in case of accident to one it can be shut off, and the other used until it is repaired, with the improved screw valves at the top and bottom, as before described. Figs. 8 and 9 show the improved flat glass reflecting water-gauge, showing three gauges, one behind the other, and each glass acting as reflector for the front one, the object in this gauge being, in case of accident to the front one, the valves at the top and bottom can be shut off, so that the height of water can be seen in the second glass, and so on to any number. Figs. 10 and 12 show an improved flat glass gauge. The glasses in this instance are arranged in four circular pieces, in place of one long glass, and there is also an improved mode of packing the glasses on the edge by ordinary packing with a screw or gland stuffing-box, which will be clearly understood by sectional drawing (Fig. 12). Figs. 11 and 13 show square glasses in place of round ones (as described). Figs. 14 and 15 represent an improved flat glass universal water-gauge, arranged in a circular frame, to be packed on the edge of the glass with ordinary packing, instead of the joints being made with red lead or india rubber; and also an improved mode of shutting off all communications with the boiler by one external movement. Fig. 16 shows an improved circular glass reflecting water-gauge, with an improved pressure and thermometer combined; that is to say, it will indicate height of water, pressure of steam, and temperature of steam, and also an improved mode of shutting off all communications (as before stated). Fig. 17, shows an improved flat glass water gauge, combined with pressure and brine gauge, and low water alarm whistle. Fig. 18 shows an improved flat glass water-gauge combined with low-water alarm whistle and frictionless water-gauge; that is to say, if any accident occurs to the front glass, the communication between the boiler and glass can be shut off, and the weight of the water will be shown by the index inside the gauge. Fig. 19 shows in section an improved reflecting flat glass water-gauge, and instead of the glass being put in in two flat pieces, it is one solid piece of glass with a slot or hole down the middle; this form of gauge avoids all making of joints; there is a slight frame placed round it to protect it from accident. Fig. 20 shows in section a flat glass water-gauge, and mode of putting packing round the edges of the glass, instead of the joints being made on the top of the glass; the piece shown in the middle is separate from the body of the gauge, and also serves as a gland for packing the two glasses. Fig. 21 shows in section another mode of putting an improved flat glass water-gauge together, being packed on the edge of the glass, which is found the best in practice, there being no oxidation from the red lead in the water-space between the glasses. Fig. 22 shows the improved tubular glass water-gauge, for shutting off all communication with the boiler by one movement. Figs. 23 and 24 show an improved flat glass water-gauge applied to the front of an ordinary tubular gauge, so that they can work with the flat or round glass. It can also be used on any water gauge in use at present. The flat-glass gauge can be used in place of the round tube between the stuffing boxes, if preferred, being on the front, the advantage being, that by its being on the front, you get a much longer range of water, and it will show the lowest water line to the crown of fire-box, which cannot be seen in ordinary gauges on account of the depth of the stuffing boxes. Figs. 25 and 26 show an improved flat glass water gauge, fitted with patent enamelled reflector, applied direct into the front of the boiler, with screw valves at top and bottom. (See specimens No. 12).

231. Patent Steam Boiler and Super-heating Apparatus; Pullan, Cresswell and Longstaff.—Exhibited by Thomas Cresswell, Surrey Iron Works, Blackfriars-road, S.



By this drawing a vertical boiler is shown, having a transverse chamber extending from water space

to water space across the fire-box, and having within it cones which project upward from the fire, and connected with the upper portion of the fire-box by means of hollow stays, whereby a free circulation of heat is obtained. The improved form of superheating is shown applied to a locomotive boiler wherein a series of tubes are employed, which pass through the main tubes of the boiler, and through which the steam is led on its passage to the cylinders, thereby being brought into contact with the heated products of combustion, previous to their escape into the atmosphere. An enlarged view of these tubes is given, showing different modes of connecting them. This form of superheater is shown fitted in the upper part of the fire-box of a portable engine. The series of tubes in this may be so arranged as to cause the heated gases, or steam, to travel over the fire as many times as may be found advantageous in practice. Another arrangement is shown applied to a stationary or marine boiler, in which a horizontal longitudinal chamber is placed above the boiler, its interior being placed in direct communication with the steam of the same by means of suitable tubes. Spaces are formed at each end of the chamber by means of partitions, the one space being open to the fire-box and the other to the smoke-box of the boilers. Communication is also made from space to space by means of a series of tubes passing through the body of the chamber. The heated gases from the fire-box passing through these tubes, will dry or superheat the steam which issues into the chamber from the boiler. The amount of heat imparted to the steam may be regulated by means of dampers placed between the fire-box, smoke-box, and chamber already described.

232. Patent Rotary Steam Engine; R. A. and M. Jefferson, 30, North-street, St. John's Wood, N.W.

(See Model, No. 21.)

233. Rails and Railways; H. L. Corlett, A.C.E., Inchicore, Dublin.—Exhibited by W. and J. H. Johnson, 47, Lincoln's-inn-fields, W.C.

This drawing illustrates various novel forms of cast iron chairs with wedge and screw fastenings especially adapted to the securing of the rail ends, also improved forms of rails, whereby the use of sleepers, chairs, and fish plates, is rendered unnecessary, whilst, at the same time, the bearing surface or tread is increased and made to correspond to the conical form of the peripheries of the wheels, and the point of support is elevated to as near the top of the rail as is practicable, so as to secure a continuous and level surface, combined with durability of structure and facility for executing repairs.

234. Patent Steam Engine Governor; William Leatham, Brookfield Works, Leeds.

(See Model, No. 15.)

235. Patent Key for Securing Rails; James Morris, 8, Albert-square, Clapham-rd., S.

In the drawing, fig. 1 shows a transverse section of a railway chair of an ordinary construction, having a rail secured or fastened therein by a key or wedge according to this invention. The form however of the key or wedge will require to be varied when the interior of the jaw of the chair or the section of the rail differs from what is shown in the drawing. Fig. 2 shows a front view of the key or wedge made according to this invention, and fig. 3 an end view thereof. The key or wedge is cast or formed with its inner surface to come next the rail, and with its outer surface to come next the interior of the jaw of the chair and the rail. The surfaces of the key correspond in general contour or outline with the surfaces of the rail and the jaw of the chair, but not so as to fit tightly. The key or wedge is of metal, and is cast or formed with a recess in it, to receive a piece of dry wood in such manner as to protrude beyond the metal surface of the key or wedge, so as to cause the metal key or wedge (which, without the wood, is, as above stated, formed to fit easily between the rail and the jaw of the chair), to fit tightly and require to be driven in between them with force. (See Model No. 30.)

236. Drum Traction Engine; J. and R. Blackburn, Long Eaton, Derby.—Exhibited by W. and J. H. Johnson, 47, Lincoln's-inn-fields, W.C.

In this traction engine a large drum or cylinder is used, which acts as a supporting and driving wheel to the engine, by which arrangement a larger traction and supporting surface is obtained, and the adhesive power is increased, whilst the injury to the road is materially diminished.

237. Patent Machine for Breaking up Roads; James Braby, jun., 32*a*, Newington-causeway, S.E.

(See Model, No. 123.)

238. Patent Improved Steam Boilers; John Redfern, 33, Cumberland-road, Southsea.

(See Model, No. 5.)

239. Patent Metallic Clamps to Close Rents, &c., in Fire Engine Hose; R. Dawbarn, Wisbech.

(See Model, No. 19.)

240. Hydraulic Steam Hammer and Hydraulic Anvil; Imray and Copeland, 65, Bridge-road, Lambeth, S.

The principal features of this hammer consist in—1. The arrangement of the steam valves, slides, and ports for working the steam at full pressure for the up-stroke, and either expansively or at full pressure for the down-stroke, and for cushioning the piston on its passing the ports, by means of the compressed steam retained beyond them. The steam pipe communicates with the slide by two valves; when the lower valve only is opened, steam enters the lower part of the cylinder, and acting on the annular surface of the piston, raises the piston-rod and striker, and the same steam, on turning the slide, expands into the upper part of the cylinder, where it acts, with the reduced pressure due to its expansion, in propelling the piston-rod and striker downwards. But when the upper steam valve is also opened, fresh steam from the boiler enters the upper part of the cylinder, where it acts with its full pressure, and propels the piston-rod and striker downwards, with proportionally great

force. The ports by which the steam escapes after acting on the piston, are placed at some distance from either end of the cylinder, and the piston before reaching either end of its stroke covers the exit ports, and thus retains a portion of the steam, which, becoming compressed by the advance of the piston, acts as an elastic cushion to save it from striking the end of the cylinder, and to start it like a spring for its next stroke. The slide itself is circular in section, and made slightly conical, to secure accuracy of fit in its case, and it is worked by a simple hand-lever. The arc through which the lever is moved by hand, and the time during which the workman permits it to dwell at the extremities of its vibration, regulate the speed and intensities of the strokes; and it is practically found that a little experience in working the lever enables the workman to regulate the strokes with the greatest delicacy. 2. The construction of the striker as a cup, containing oil, which forms a liquid cushion, and saves the piston-rod from upsetting, and the piston from damage by the blow. In many hammers where the weight of the piston and rod forms an essential part of the striking mass, it is necessary to have recourse to cast-steel piston rods, and very strongly made and even solid pistons, in order to avoid the upsetting of a soft rod, and the breakage of the pieces which constitute the piston. But in the hydraulic hammer it is said that the oil cushion which is interposed between the actual striker and end of the piston rod, renders all such precautions entirely unnecessary. A soft iron piston rod and a cast iron piston can thus be used without danger of upsetting or breakage, and, at the same time, the quality of the blow is not deteriorated, for the oil is really less readily compressible than the solid metal, or, in other words, the compression takes a longer period to pass through the liquid, so that at the instant of delivering the stroke, the whole mass acts with undiminished force, as great as, if not more than it would be, were there a solid metallic connection throughout. The ring which retains the collar of the piston rod within the cup of the striker, is made with internal cavities to catch such portions of the oil as may be spurted up at the instant of the stroke, and when the piston ascends with the weight of the striker hanging from it, the pressure of the air forces the oil back into the cup to be ready for the next blow. 3. The arrangement of the anvil on the ram of a hydraulic cylinder connected with a cistern about 15 feet high, and fitted with an ingress and an egress valve, so that the anvil can be raised or lowered to suit the tools or work placed on it. The blow is thus received on a liquid base, which changes the concussion into a diffused fluid pressure, and saves the hammer and foundations from the destructive effects of the shocks which in other hammers are transmitted through solid materials. Practically, the hydraulic anvil, without at all diminishing the sharpness and efficacy of the blow, renders expensive foundations altogether unnecessary. The actual pressure shewn on a gauge applied to the cylinder at the time of the stroke, does not exceed 60 or 70 lbs. per square inch, which is a strain so moderate on the cylinder and its base, that no damage can result from its constant repetition. As the ram is made of considerable area (practically about the size of the steam cylinder), no great head of water is necessary for raising it. A cistern raised 12 or 15 feet from the ground, gives sufficient pressure to raise the anvil some inches in a few seconds, and on opening the egress valve, the anvil sinks down with considerable rapidity; thus even during a heat the altitude of the anvil block can be increased or diminished at pleasure, so as to suit the depth of the work and tools that may be placed on it. As in the case of the oil cushion in the striker, so with the hydraulic anvil, the small and slow compressibility of the liquid gives a similar sharpness and resiliency to the blow, which more resembles that given by a sledge hammer worked by hand, than it does the stroke of a dead weight falling by gravity or propelled by pressure. 4. Simplicity of general construction and of action, and consequent economy of manufacture and fixing, facility of working, durability and security against derangement and wear.

241. Steam Hammers; R. Morrison, Ouseburn Engine Works, Newcastle-on-Tyne.—Exhibited by W. and J. H. Johnson, 47, Lincoln's-inn-fields, W.C.

These views illustrate Mr. Morrison's most recent improvements in steam hammers for forging puddled balls or "blooms," and for smithy and general work. One great peculiarity in all these hammers is the heavy hammer bar which forms the piston rod of the cylinder. The piston is forged in one piece, with the hammer bar or rod near its longitudinal centre, and the upper portion of the hammer bar passes out through a deep stuffing box, formed on the top cover of the cylinder, which serves as a tubular guide for that portion of the bar extending out beyond the stuffing-box. The slide valves are worked by a slotted segmental link and roller, the latter carried by the top end of the hammer bar, and working along the slot of the link. In the puddling hammer, the opening between the standards is of a gothic form, and the cylinder is bolted between the standards, in a line therewith, but in the hammers for general purposes the standards are made to overhang their lever considerably, and the cylinder is bolted at the overhanging portion, so as to stand out clear beyond the front of the framing.

242. Direct Acting Gas Exhauster; George Anderson, 104, Leadenhall-street, E.C.

This consists of a double-acting pump, which receives and delivers the gas at each end alternately. The two figures to the right of the drawing represent the steam-engine and the exhauster connected to opposite ends of the same crank shaft. This arrangement dispenses with all intermediate gearing, and is economical in its construction. The radii of the exhauster crank can be altered to suit the quantity of gas made, or a larger cylinder may be placed in the same spot, the length of spoke and centre distances being uniform to admit of this.

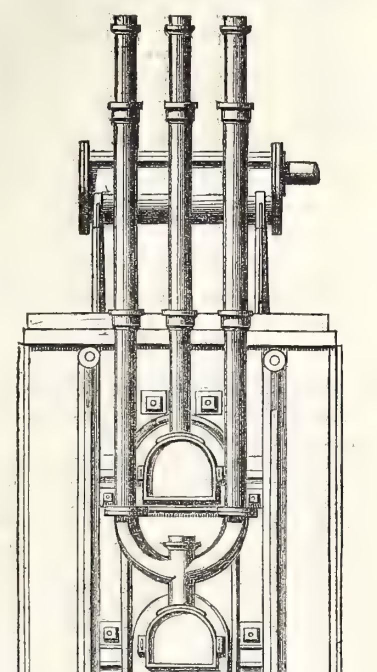
243. Patent Retort Settings for Gas Works; George Anderson.

The peculiarities of this mode of setting are, instead of having a furnace to each oven of retorts there are three ovens heated by two fires. The three centre ovens of the drawing represent what is technically called a "triplicate," two of which are set with fire-clay retorts, and a furnace each. After the heat has circulated through these two ovens, it is caused to pass into the

centre oven, where it heats ten iron retorts. The furnaces may either be constructed to consume coke or tar. The tar fire-place is of a peculiar construction, consisting of an inclined plane of brickwork, down which the tar trickles, and by thus presenting much surface, and by the introduction of hot air through the ash-pit, which, in this case, is fitted with a door, a smokeless combustion is obtained. The two settings of retorts, forming the extreme right and left of the drawing, represent another mode in which nine retorts are heated by one fire. The drawing represents a range of retorts, erected for Mr. E. Goddard, of the Gas Works, Ipswich.

244. Patent Vertical Oven Gas Retort; William Richardson, Engineer, Dudley.

This retort may be constructed either in iron or clay. The method of working it (after it is heated to the required temperature), consists in first charging the requisite quantity of coal through the lower mouth-piece, and when the first charge is worked off, putting the next charge of coal through the upper mouth-piece upon the heated coke of the previous charge; and, if necessary, the third or fourth charge of coal can be put through the upper mouth-piece



upon the coke of the previous charge. The difference in the dip of the pipes in the hydraulic main will compel the gas, as it is evolved from the coal, to descend through the hot coke of the previous charge, whereby more gas is produced with less tar and ammoniacal liquor, and the coke becomes more firm and fixed, and is consequently better suited for general purposes. As this retort will require to be drawn only once in twelve or twenty-four hours, a saving of labour will be effected.

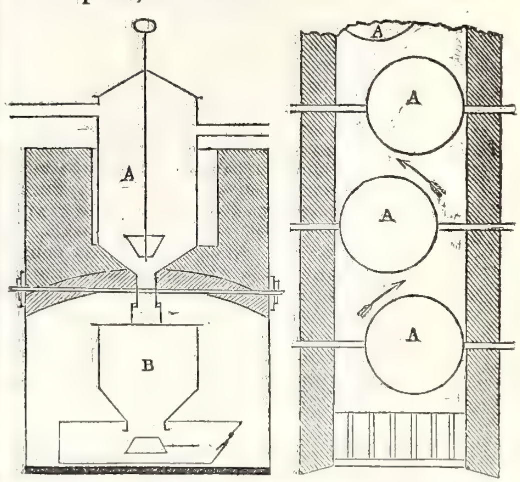
245. Patent Gas Retort Bed; George Walcott, 24, Abchurch-lane, E.C.

(See Model, No. 34.)

246. Gas-holder, erected at the South Lambeth Distillery; J. T. B. Porter and Co., Gas Engineers, Lincoln.—Exhibited by W. and J. H. Johnson, 47, Lincoln's-inn-fields, W.C.

This is exhibited more as an example of the adaptation of highly ornamental designs to ordinary utilitarian purposes than of any recent improvements in this class of apparatus. The tank, pillars and girders are all highly decorated. The tank is formed of cast-iron plates, its edge being terminated by a battlemented or castellated cornice, and at either side provided with spouts and heads of the same character to carry off the waste water, thus preventing any overflow on the tank sides during rain or otherwise. The tank is ten feet deep, and sunk into the ground four feet, resting upon a bed of concrete one foot in thickness; outside the tank rise three piers of solid masonry, capped with stone bases for the pillars to rest upon. Each pillar is square in plan and formed of open tracery in four stages, with bold ornamental bases and quatre-foiled caps, on each side of which are embossed shields bearing the insignia of the proprietor, and each is surmounted by a *fleur de lis*. The connecting beams or girders are formed of open trefoils capped by an ornamental cresting of flowers and cusps, the angles being filled with traceried brackets.

247. Patented Improvements in the Manufacture of Salt; Charles Greenway, 4, Albert-place, Cheltenham.



The following are the references to the drawing:—A, boilers for engine; B, receiver for salt. The object of this invention is, 1st, to make use of the steam generated in evaporating brine

for the evaporation of other brine; 2nd, to save coal by a more direct application of the heat to the brine; 3rd, to save labour in withdrawing the salt; and, 4th, to reduce the wear and tear to a minimum.

248. Patent Collapsing Swan Paddles; Daniel Baldock Lewis, 98, High-street, Cheltenham.

These paddles are intended to be worked with a crank and connecting rod on trams or slides attached to the sides of the vessel, the stroke being horizontal and beneath the surface of the water. The paddles consist of two flaps secured by a pin running through a rule joint, so that they can be easily separated and repaired.

249. Improved Eccentrical Propeller; W. H. Crispin, Stratford, E.

(See Model, No. 71.)

250. War Ships Safety Ports; George Ellis, 4, Collier-street, N.

This arrangement of ports is intended to reduce the space open to assault from 30 to 50 per cent. without diminishing the room requisite for the efficient operation of the guns. The straight lines show the forms and dimensions of the ordinary port.

251. Salvage Steam Ship; Captain Copping, Londonderry, and John Weild, Glasgow. —Exhibited by W. and J. H. Johnson, 47, Lincoln's-inn-fields, W.C.

The object of this ship is to save shipwrecked property. The vessel is what is usually termed a "twin," being composed of two hulls of unequal size, placed at some distance apart, and connected together by transverse and vertical "lattice girders," which project above and extend over both decks, the whole being covered with a deck on the same level, making them as rigid as one vessel. Both hulls are divided into a number of water-tight compartments. The propelling power is derived from a pair of oscillating engines connected directly to the shaft of a single broad paddle wheel placed in the space between the hulls. The lifting machinery consists of four sets of double shears arranged along the side of the larger hull of the vessel. Connected with each set is a large hydrostatic ram or press, worked by a powerful steam-engine. To these rams suitable pitch chains and blocks are attached, the pumps of which are connected to the same main pipe from the pumps when lifting, so that the strain comes equally on all the tackle. The chains pass down through the hollow ram, and are attached to the cross head below, the slack being taken up by large drums arranged for that purpose. Whilst the operation of hoisting is in progress, a sufficient quantity of water is pumped into the compartments of the smaller vessel, to counterbalance the weight lifted by the machinery on the larger one.

252. Patent Economic Front-Ignition Cartridge for Breech-loading Guns; William Sear, Wolverton, Bucks.

This cartridge has a metal end, readily attaching and detaching from the paper tubes or cases; being turned in a lathe great accuracy is obtained in fitting the gun. The recoil is also diminished, and the charge being ignited in front, prevents any portion of the powder being blown from the barrel unconsumed.

253. Patent Breech-Loading Fire-arms; Thos. Shedden, 4, Maitland-street, Edinburgh.

The drawing shows the invention applied to a common musket-barrel.

254. Rifle and Projectile; John Scott, 23, Michael's-place, Brompton, S.W.

255. Patent Stereotrope or Stereoscopic Thaumatrope; W. T. Shaw, 110, Bunhill-row, E.C.

(See Specimen, No. 99.)

256. Turret Clock; John Bailey and Co., Albion Works, Salford, Manchester.—Exhibited by W. and J. H. Johnson, 47, Lincoln's-inn-fields, W.C.

This represents a turret-clock, constructed by the above firm for All Soul's Church, Halifax. The hour is indicated upon two dials, 8 feet 6 inches in diameter, and the arbor carriers are attached to the frame by bolts and steel steady pieces, so that any single wheel may be removed at pleasure without disturbing the frame. The clock is provided with patent wire ropes, and has a set dial to set the hands by maintaining power. A compensating pendulum is used 150·55 inches long, the bob of which weighs two cwt. The pendulum springs are made short in order to enable the point of suspension to be well defined. In the striking train the ordinary pin-wheel is dispensed with, and a snail motion with friction roller is substituted, thereby reducing considerably the friction and wear and tear of the parts.

257. Patent Cloth-Padded Wood Strips for Windows, &c.; John Brown, Architect, Norwich.

(See Model, No. 149.)

258. Diagrams Illustrating the Principles of Motion and Force; J. C. Bowler, Bowden, near Manchester.

No. 1 is a diagram, indicating the first principles of motion and power, and the laws which govern material things, considered as in a state of rest or in motion. No. 2 diagram is founded on No. 1, and is intended to show that motion and power may be obtained by two opposing weights. The power of the weights acting upon the levers is calculated on the supposition that (in the different positions in which they are represented) they are in a state of rest, the power or force of bodies in a state of motion being different in its results or effects to the same bodies when considered as in a state of rest. No. 3 diagram is an outline drawing, being an illustration of diagram No. 1, and is a continuation of diagram No 2, showing how the principle of unity or oneness of purpose in opposing forces may be made available and practicable to every-day purposes, the motive power (as a suspended weight, pressure, &c.) being fixed or stationary.

259. Patent Improved Inkstand; John Wilkins, 18, Essex-street, St. Peter's, Islington, N.

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Journal of the Society of Arts.

FRIDAY, APRIL 5, 1861.

INTERNATIONAL EXHIBITION OF 1862.—GUARANTEE DEED.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others who take an interest in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £354,150, have already been attached to the Deed.

GUARANTEE FUND FOR THE EXHIBITION OF 1862.

The following additions have been made since the last announcement, in the *Journal* for March 29 :—

*** *The name marked with an asterisk is that of a Member of the Society of Arts.*

NAME.	AMOUNT.	REPRESENTING THE OBJECTS OF THE SOCIETY—ARTS, MANUFACTURES, AND COMMERCE.
Charles Reed, F.S.A., Paternoster-row, E.C.	£100	Arts.
Edward Ellis Allen, 2 Brunswick-pl. Brompton, S.W.	100	Arts.
Samuel Robert Lock, 178, Regent-street, W.	500	Arts.
Stafford H. Northcote, 29, St. Paul's Churchyard, E.C.	250	Commerce.
Joseph Bentley, 13, Paternoster-row, E.C.	100	Arts.
T. Seville Truss, 53, Gracechurch-street, E.C.	100	Commerce.
James Joseph Stainton, Meadows of Lewisham, E.C.	100	Arts.
Jabus Stanley James, 26, Watling-street, E.C.	100	Arts.
James Grieve Lyle, 20 Little Moorfields, E.C.	200	Commerce.
James Reeve Burgess, 47, Brewer-street, Golden-square, W.	100	Commerce.
R. A. C. Loader, 23 and 24, Finsbury Pavement, E.C.	500	Commerce.
Sassoon David Sassoon, 17, Cumberland-terrace, Regent's-park, N.W. ...	1,000	Arts.
W. H. Martin, Burlington Arcade, W.	100	Commerce.
George W. Franklyn, M.P., Torquay	500	Arts.
Shepherd, Hill, and Co., Union Foundry, Leeds	150	Manufactures.
Thomas Richardson, Linen-hall, Dublin	200	Commerce.
*Cassell, Petter, and Galpin, Belle Sauvage-yard, E.C.	250	Arts.
Thomas Lambert (Thomas Lambert and Son), Short-street, Lambeth, S. ...	500	Commerce.
Miss Burdett Coutts, Stratton-street, Piccadilly, W.	3,000	Arts.

By Order,

P. LE NEVE FOSTER, *Secretary.*

THIRTEENTH ANNUAL EXHIBITION OF INVENTIONS.

The Exhibition was opened on Monday last, the 1st of April, and will remain open every day until further notice, from 10 a.m. to 4 p.m., and is free to members and their friends. Members by ticket, or by written order, having their signature, may admit any number of persons. Members of Institutions in Union with the Society are admitted on showing their cards of membership.

A sheet of tickets has been issued to every member. Additional tickets may be had on application to the Secretary of the Society.

EXAMINATION PRIZE FUND, 1861.

The following are the Donations up to the present date :—

	£	s.	d.
Charles Brooke, M.A., F.R.S. (2nd donation)...	2	2	0
Harry Chester, Vice-Pres. (4th donation) ...	5	0	0
Thomas Dixon (annual)...	1	1	0
George Goff (2nd donation)	5	0	0
F. Seymour Haden (annual)	2	2	0
W. Haldimand (3rd donation)...	10	10	0
James Holmes (annual)...	1	1	0
Dr. Skey	1	1	0
Rev. F. Temple, D.D. (3rd donation)... ...	5	5	0
Rev. A. Wilson (3rd donation)...	2	2	0

SIXTEENTH ORDINARY MEETING.

Wednesday, April 3, 1861.

The Sixteenth Ordinary Meeting of the One Hundred and Seventh Session was held on Wednesday, the 3rd inst., Thomas Webster, Esq., F.R.S., in the chair.

The following gentlemen were proposed for election as members of the Society:—

Brett, John W.	2, Hanover-square, W.
Bruton, Leonard	Chamber of Commerce, Bristol.
Callow, James William	8, Park-lane, W.
Courtenay, L. Walter	Oak-house, Forest-hill, S.E.
Debenham, W., junr.	42, Wigmore-street, W.
Dennys, Haddock	3, Percy-terrace, Islington, N.
Dugdale, John	Burnley.
Fleming, John	21, Austin Friars, E.C.
Maull, Henry	Lewisham, S.E.; and 119, Piccadilly, W.
Potter, Wm. Simpson	1, Adam-street, Adelphi, W.C.
Robertson, Alexander	Highfield, Sheffield.
Room, Benjamin	36, Parliament-street, S.W.
Shaffner, Col. T. P.	42, Half Moon-street, Piccadilly, W.
Stevenson, James	Jedburgh, N.B.
Vulliamy, Lewis Llewellyn	Clapham-common, S.
Young, Thomas	14, Eaton-square, S.W.

The following candidates were balloted for and duly elected members of the Society:—

Abraham, Henry Robert	3, Bridge-street, Westminster, S.W.
Avery, Thomas Charles	Gloucester.
Biddulph, John	Swansea.
Blyth, Philip P.	53, Wimpole-street, W.
Bowen, Owen	4, Chatham-place, Blackfriars, E.C.
Brogden, Alexander	Ulverstone.
Broome, Robert	Burbage-house, Buxton.
Bruce, Right Hon. Sir James L., Knight	The Priory, Roehampton, S.W.
Butts, Thomas	20, Chester-terrace, Regent's-park, N.W.
Derry, David	Plymouth.
Fane, Wm. Dashwood	Board of Trade, S.W., and 7, Norfolk-crescent, Hyde-park, W.
Fisher, Peter	Whitehaven.
Fox, R. W.	Grove-hill, near Falmouth.
Halloran, Charles	Paignton School, Preston-house, near Torquay.
Hannay, Robert	Ulverstone.
Hannay, W.	Nottingham.
Harrison, George	Newport, Monmouthshire.
Harvey, John Francis	145, Strand, W.C.
MacNeill, Sir John, F.R.S.	Mount Pleasant, Dundalk.
Malcolm, John Wingfield, M.P.	7, Great Stanhope-street, Mayfair, W.
Moorsom, Vice Admiral C.B.	5, Montague-place, Russell-square, W.C.
Pain, George	New Lodge, Salisbury.
Petre, Hon. Henry W.	Bedfords, Romford.
Poole, James	Wick-house, Durdham Down, Bristol.
Pridham, T.	Hyefield, Bideford.
Saunders, Chas. Alexander	Great Western Railway Station Paddington, W.
Spowart, T.	Broomhead-house, Dunfermline.
Taylor, J. John	Earsdon, Newcastle-on-Tyne.
Terrell, William	7, Apsley-place, Redland, Bristol.
Thomson, Wm. Gordon	14, Clifton-gardens, Maida-hill, W.
Thring, Henry	5, Queen's Gate-gardens, South Kensington, W.
Turquand, William	4, Mansfield-street, Cavendish-square, W.
Tylden, J. W.	Milsted Manor, Sittingbourne, Kent.
Underwood, Joseph	5, Hyde-park-gardens, W.
Walter, Capt. Edwin	37*a*, Upper Grosvenor-street, W.
Williams, John	Ketley-hill, Wellington, Salop.

The following Institutions have been taken into Union since the last announcement:—

Derby, St. Peter's Evening Schools.
St. Thomas, Charterhouse, Evening Classes.

The Paper read was—

SOME ACCOUNT OF AMERICAN IMPLEMENTS AND ECONOMIC CONTRIVANCES.

By C. W. Eddy, M.A., M.B., formerly Travelling Fellow of the University of Oxford.

I think the observing traveller in America cannot fail to be struck with astonishment at the vast amount of work that has been achieved, of forests cleared, of land reclaimed, of roads, railroads, and canals constructed, and of cities built by a sparse and scattered population, in the brief period of time that has elapsed since the first peopling of the country. To enumerate only a few of the marvels of American progress; that great scion of the English stock has already overspread a territory equal to all Europe in extent; has dug 5,000 miles of canals, constructed 16,000 miles of railway, and built some half-dozen towns which rival in magnificence a like number of the capitals of Europe. It has formed a merchant navy not inferior to our own, if the lake and river tonnage be (as is only fair) included in the comparison; it is beginning to rival us in foreign commerce, and has supplanted us in the deep-sea fisheries; grows a cotton crop that goes far towards supplying the wants of the world, and produces a surplus of corn and provisions which feeds the West Indies and the eastern coast of South America, besides helping to maintain ourselves and several of our colonies. These are great results, and are the more surprising when it is considered that they have been achieved beneath a climate far less favourable to continuous exertion than our own, with summers whose relaxing heats unnerve the physical powers, and winters which for long months together bind nature in impenetrable folds of ice and snow. How, then, have these great results been accomplished, how but by the indomitable energies of that vigorous and ambitious race of which they are an offshoot, energies which are aided by an inventive faculty of a high order, and guided by the strong practical common sense which is their birthright. Place a people gifted with such powers as these on a territory so far severed from the old world, with all its social and political entanglements, that it may have free scope to fulfil the behest of replenishing the earth and subduing it, where, moreover, its numbers may be continually recruited by the boldest, most hardy, and adventurous spirits of the old world, and we need not wonder at the results we witness.

The faculties of the Anglo-Saxon race have been developed in each hemisphere, just as the varying exigencies of their situation have called them forth. John Bull, having but a small estate for the maintenance of his numerous family, which is crowded in the ratio of 223 to the square mile, has applied all his powers to rendering this little property as productive as possible, hence the great improvements in agriculture, in the rearing of stock, and increasing the productiveness of land, as well as a majority of the great inventions in the manufacture of

raw materials, are his. The Yankee, on the other hand, having a vast wilderness to subdue, to which his race even now bears a proportion of only eight to the square mile, has directed his energies to the means whereby man's feeble physical powers may be rendered equal to so great a task, and herein has shown an originality of conception, a fertility of invention, and a boldness of enterprise truly surprising. I recently paid a visit to that part of the world, and among various objects which interested me there and engaged my attention, were the contrivances for economising labour which the necessities occasioned by its scarcity have led our cousins to invent and adopt into general use. I was struck by the ingenuity of many of their implements, their superior simplicity of construction and cheapness when compared with corresponding ones amongst ourselves. For instance, that great pioneer of civilisation, the backwoodsman's axe, costs in America one dollar. Here I am asked 9s. for one, certainly not better made, nor of better materials, for there can be no better judge of the temper and make of an axe than the backwoodsman, and the true American axe is well known to stand severe frost better than ours. No less was I struck by the simple, ready, and yet effective ways which I witnessed there for overcoming difficulties, and arriving at results which we should only suppose attainable by more elaborate and costly methods.

Of these implements and contrivances for facilitating labour I have been invited to give you some account, and have prepared some diagrams and little models in illustration of them and here, at the outset, I must premise that I do not flatter myself with the idea that I am about to introduce a series of entire novelties to the British public. You will observe objects here with which many of you are, doubtles, familiar; but I think that Englishmen, whether agriculturists, mechanics, or engineers, are not as familiar, as they should be, with the methods by which labour may be saved and is saved elsewhere; and this is a species of knowledge which either of these classes, or indeed any of us, may find very serviceable in case we transfer our industry from the crowded arena of England, where labourers are plentiful, and the division of labour is carried to its utmost extent, to the outlying and thinly-peopled parts of our vast empire, the circumstances and conditions of which closely resemble those of America, for I think it will be acknowledged that many of these happy contrivances and ways of meeting ordinary wants, which I shall have to describe as practised in America, though they may be but little suited to the highly artificial condition of England, would be likely to be found very useful in the untamed wilds of our colonies.

The question in each case turns simply on the price of manual labour; in England unskilled labour is procurable at 1s. 6d. to 2s. 6d. per day; in America, the same class of labour is frequently not to be had on any terms, and if procurable, commands one dollar or more, with food; and this too is its value in some of our own colonies, whilst in others, as the gold colonies, it is higher still. There are, however, some of these contrivances, of which you see diagrams here, very applicable in my opinion even to the wants of England, such as the spacious and powerful steam ferry boats, with the ferry docks, which are necessary appurtenances of them, the tramway cars, which I am happy to see a good attempt is being made to introduce into London, the machinery for handling grain in bulk, the stump extractor, the railway horse-power, and several of these agricultural implements, which I would I could persuade our farmers to try. But in my efforts hitherto to do so I have discovered two great obstacles to the introduction of any novelty; one is the prejudice, not confined to this class alone, in favour of everything English, and against everything foreign. Swift has said that Englishmen regard a novelty as a cow does a rubbing post set up for the first time in her field; at first she is very shy of it, at last comes and smells at it, and finally puts it to its proper use. But I have found that the cow's master takes a much longer time than the cow herself before he ventures to smell at the suspicious-looking thing. Another great obstacle arises from the difficulty of teaching the use of any novel implement to the uneducated English labourer, and the jealous hatred which he entertains for any "new fangled" device, from his fear lest it should take the bread out of his mouth. I call him uneducated, for how little instruction does he get at the village school of that practical kind which may best aid him in fighting the battle of life. It is not so in America; the scheme of education at the excellent common schools which are supported by the several states and municipalities, which every boy and girl attends, comprises instruction in the common arts of life, and the physical sciences, especially mechanics and chemistry. In this respect, at least, I think we need not fear to take example from the Americans.* But to turn to the implements.

Suppose we first consider those used for clearing land. The first in use, as in importance, is the American felling-axe, which is so well-known in every timber region of the world. It consists of a broad, wedge-shaped, head, with an ample eye, inserted into which is a long handle of tough hickory, that famous wood which is their synonym for every thing strong and tough, and which, I am happy to see, is beginning to be imported into England for the same purposes for which it is so extensively used there, viz., for handles of implements, shafts, light wheels, &c. You see how exactly the handle is curved to fit and retain the grasp. The effect of this weapon in the hands of a backwoodsman is surprising, its length of handle and perfect balance enables him to plant his blows with a force and precision of which one has no idea without seeing him at work. The head of this axe is, I am told, on the very pattern of the Headsman's axe, such a one as may be seen in the Tower by any one who may have the curiosity to compare the two. Large quantities of these axes are made by convicts in the State prisons, and sold at a slightly remunerative price, and what can be a more appropriate occupation for prisoners, than to furnish the poineers of society with a cheap instrument for extending the area of civilization. I may here observe, that the plan adopted in the large State prisons, is to let out the labour of the prisoners by contract to manufacturers, who provide the necessary tools, and instruct the prisoners in their use. This plan renders the principal State prisons entirely self-supporting, and what is of far more importance, teaches the prisoners a trade by which they may live when their time expires. I consider it a system well worthy of our imitation.

Next in order to the felling axe comes the stump-extractor, a compound lever of wood, strengthened with iron, 30 feet long, with a wheel at each end. It is worked horizontally, as you see, generally by a team of oxen. The firmest rooted stump is made the fulcrum fastened by the centre to which, and aided by these pullies, it extracts all the surrounding ones. This work is usually done by contract at an expense of about 12 dollars an acre, and for a few dollars more the stumps are drawn into line to form fences, the most durable and formidable of all dead wood fences. This is the stump extractor most generally used, simplicity and strength being its great recommendations; but I must mention another which is more compact and portable, therefore better adapted for going into the forests; it is an iron cylinder, on wheels, to which the

* This system produces a class of men who are called machinists, persons who understand machinery and the nature and strength of materials, besides being themselves good mechanics. These persons are capable of planning and setting up any kind of mill-work. It is a common thing for them to travel in the Southern States, erecting cotton presses, which they do with the help of a few plantation hands in a rough but effectual way, very pretty to witness. In the Northern States these men are a good deal engaged in substituting turbine wheels for the old water wheels, and this they will undertake often at their own risk, being paid by a share of the profit ensuing.

power is applied as to a capstan. Hall, of Owego, New York State, is the maker and patentee of this latter.

Here is a diagram showing a method of applying steam power for felling and cutting up trees, which I have seen used, but I do not recommend it, because a steam engine is too complicated and expensive a machine to be used profitably for such rough work as this. The curiosity about this is the manner in which the steam is conveyed through an armed flexible india-rubber hose from the steam chest to the cylinder, the piston rod of which is formed into a saw. It is an engine more curious than useful, and not one generally used in America.

I have mentioned one kind of dead wood fence, but the kind most used in America is what is there called a snake fence, and as this is the one which of all kinds costs the least trouble, and is the most readily put up in newly-cleared land where wood is abundant, I will describe it. It is formed by laying slabs of split stuff, no matter how rough, one over another with their ends overlapping zig-zag fashion, till the requisite height is attained, and then driving posts in at each side where the ends overlap. It is as ugly as can be, and in the States the eye gets quite weary of its monotonous uniformity, but the hard thrifty American farmer does not study the ornamental much. Not the least advantage that it possesses is that, whilst very strong against lateral pressure, it is easily pulled down in case of fire, or for removal of boundaries. Now in Australia I have known many miles of expensive post and rail fencing burnt in a few hours, owing to the difficulty of pulling it down and so arresting the fire. Cheaply as this fence is put up, so immense is the extent of it in the States that the total value of it has been computed to exceed that of all the houses and buildings there. It must be observed that there is difficulty in America in rearing live fences, owing to the severity of the cold in winter and the droughts of summer; the same difficulty is felt in our Australian colonies.

Here is an earth auger for boring post holes. It would not do for such posts as we put up, formed out of a young tree, with the root end planted in the ground, and only the part above ground squared; they, on the contrary, take care to set their posts the reverse way to that in which they have grown, or upside down, because say they, this prevents the moisture from the ground ascending in the channels in which the sap ascended whilst the tree was growing, and thus rotting the post. They also take the precaution of charring the end. I do not think this plan would be so generally adopted amongst that shrewd and practical people unless there was something in it. Portable mortising machines, worked by hand or foot, are in general use for boring the posts when that is needed; with these, however, my hearers are probably familiar.

The settler in the Eastern States or in Canada, has a more obstinate enemy to contend with than timber, in clearing his land, and this is presented by the boulders with which the whole face of the country for thousands of square miles in extent is overspread. These have undoubtedly been brought and deposited in their present localities during countless ages by ice drifting from the North, and no one who has not been there can form an idea of the extent to which they encumber the ground. It is a common saying that the principal productions of New England are ice and granite; the ice, however, which has brought the granite there, affords the means of getting rid of it, for in winter when there is little else to do, the settlers are industriously employed in sledging away these boulders. In the more Southern States, where the snow does not freeze hard enough to allow of this, the patent way of disposing of them is to bury them. They dig a hole beside a great boulder and tumble it in—out of sight, out of mind. You may think that this tells tales of superficial culture; but all American agriculture, and perhaps not this kind of culture only, is superficial. When first I heard of this way of disposing of stones by burying them, I thought it a joke, but on inquiry found it a positive fact, and I have no doubt of its being the best method under the circumstances; in fact I have so high an opinion of the shrewdness and practical sagacity of our Yankee friends, that I am disposed implicitly to believe any practice which I find in vogue amongst them to be that which is best suited to the circumstances.

The settler's house is soon put up, built of plank, both wall and roof, and lined and floored with plank, (we read of log huts, but seldom see them), for the saw-mill driven by steam or water, or in lack of these by horse power, keeps abreast of the advancing tide of population, and converts the logs into planks at a very trifling cost. The time for clearing and building is the winter, when the frozen snow makes as good a road for the lumber sleigh as can be desired. This, too, for the same reason, is the season for carrying the crops to market, for at other times the want of decent roads makes this almost impossible.

I suppose both the best and the worst roads in the world are to be met with in America; by the former I mean the plank roads, which are turnpike roads formed of 3-inch planks of hard wood, laid diagonally on a couple of stringers, the planks being fitted close together, but not fastened down. The common pavement in the country towns is also of planks. As long as these roads are kept in good repair they are as even as a drawing room floor, but when they get out of repair they are execrable. Their cost is stated at about £330 a mile for a single vehicle road, and rather more than £400 for a double one, and they are said to last good for 8 or 10 years. The cost, however, of course depends on the kind and supply of timber available, and their existence furnishes a strong proof how very cheaply timber is worked up in America. Indeed, the cost of running logs through their great water-driven saw mills is very trifling, and the operation beautiful to witness, the log being hauled up from the pond to the timber bed by the power, sawn into perhaps half-a-dozen planks at once, which are passed over rollers, and another victim hauled up in turn, all in a very few minutes. But these plank roads, unfortunately, are few and far between, and the bad roads greatly preponderate, owing to the extreme difficulty of getting men to work at what is there looked on as a degrading employment, viz., breaking stones or working on the roads.

We read of corduroy roads, *i.e.*, roads formed of trunks of trees thrown across. They are not common, however, at least not in any part of the country I have visited, for I have never seen one. The ordinary road is merely a wide track, almost impassable in wet weather. The difficulty, however, of getting men to break stones, has suggested the use of stone-crushing machines, two different kinds of which I have seen at work, and working well. One of these, that with rollers, which is adapted to crushing soft stone, is known in some parts of England, and is used extensively in America for breaking up the hard anthracite or stone coal of Pennsylvania; and the extent to which it is applicable for this purpose alone may be judged from the great quantity of this coal that is raised there, viz., eight millions of tons per annum, most of which is crushed by these rollers at a royalty of one cent. per ton. It consists of two heavy iron cylinders, studded with rows of knobs of about two inches projection, the knobs on the one playing into the intervals on the other, as they are made to revolve in opposite directions. It is driven by a steam-engine, and I have seen one of about six horse-power breaking up the Niagara limestone as fast as two men could keep it clear. These rollers are used in the mining districts of England for crushing ore, but my object in mentioning them is, because I have seen them advantageously used in America for stone-breaking, and I cannot understand why they should not be employed for that purpose in some of our colonies, where the roads, in consequence of the want of labour, are execrable. The other stone-crusher is capable of breaking up the hardest rock — quartz, hornblende, granite, &c. It consists of a ponderous mass of cast iron, against the face of which a mass of wrought iron of an elbow shape moves to and fro on a toggle joint. The motion is slight, but the power is sufficient to crack

the hardest nodules and boulders like nuts; the motion gathers the stone within the iron jaws of the machine, and as it breaks up it falls through the gauge formed by the lower edges of the opposing masses, which may be called the throat. I have seen one of these at work at New York, and doing its work well. It was worked by a 12-horse-power engine; there had been two breaks-down, owing to the mistake having been committed of applying insufficient power, but with the 12 horse-power it was working well. I have no doubt both these stone-breaking engines would be found useful in our colonies; but whether they could compete with pauper and prison labour applied to this purpose in England is another matter.

The plank roads, which I mentioned above, have been adopted in the Gold Colonies of Australia, and with them another American plan for making the best of a bad road, I mean the pole and thorough brace spring. This is the only kind of spring which will stand the shocks of the very primitive roads which are met with in these young countries. One form of it was formerly used in England, and the **C** spring is a modification of it. It consists of a tough elastic hickory or ash pole, fixed at one end into the front of the bed of the carriage, whilst from the free end a stout leather thong extends to the same part of the bed; on this thong the body of the carriage rests; the elasticity of the pole gives the requisite spring, and the strength is due to the strain being exerted at so small an angle. The cabs and buggies in the New England States are generally hung on this plan, and all the stage coaches throughout the States use a modification of it, being a strap suspended between two such poles or between two **C** springs. This form of spring possesses this further great advantage for a young country, that it is formed of common materials, is therefore cheap, and can be easily made or repaired. A spring on this principle is frequently made use of for supporting merely the driver's seat in a waggon, for the driver never thinks of walking, and it would be impossible to jog over such roads without some spring. The seat is laid on the free ends of a couple of hickory poles, which are fixed at two other points into the sides of the waggon.

Another very cheap and simple spring that I have seen used occasionally is merely a couple of inch boards laid on two pair of wheels, the axles of which are about three yards apart, the seat being placed on the middle, and the length of plank giving the requisite elasticity. When elliptical steel springs are used, they are frequently reinforced with a cushion of india-rubber, or a spiral spring pinned through the centre, so that when they come down to their bearings, this additional spring comes into play. The waggons (for carts are hardly ever seen) are the simplest things in the world, the box being made of those most useful contrivances, tenoned and grooved boards slipped into a frame, to whatever height may be requisite. The wheels are usually very much lighter than ours, and owe their strength to the fewness and simplicity of their parts, being formed of three or four, instead of half a-dozen felloes, and those of the toughest wood, steamed and bent round by lever power. The wheels of their buggies and trotting waggons are frequently made of one hoop of hickory, surrounded by a light tire. These vehicles are remarkable for their lightness and the great diameter of their wheels, which of course is doubly advantageous on bad roads, but they have no pretensions to elegance of shape, and the height of the fore-wheels renders it impossible for them to turn under the carriage; this would never do in our crowded streets and narrow lanes, but does not much matter on the broad highways of a new country, and gives them a great advantage in going ahead. Some of their covered carriages resemble an umbrella on wheels more than anything I can compare them to.

The world is a good deal indebted to America for improvements in the method of breaking horses. I think it might also learn something from the mode of training them as practised there; the first lesson that a colt learns in America is to stand quiet when haltered to a post by the hour together. Now almost every house in a street is provided with a post and a ring to it, so when a person drives up to a door, he requires no servant or street boy to stand at his horse's head, but leaves him quite safely fastened by a strap attached to the snaffle, and on market days or on Sundays when they drive to church, instead of putting the horses up, they are left in groups thus fastened; here is a great saving of trouble and expense. American horses are generally trained to bear on the rein; the faster you want them to go the harder you hold them in, and that enables them to lay out in the surprising way they do in their famous trotting matches. It is dangerous to talk in England of the speed the first-class American trotters, such as Ethan Allen or Flora Temple make. As I could not have believed the pace unless I had timed them myself, I will maintain a prudent silence about it. As soon as you slacken the reins the horse slackens his pace; and when, in driving, you throw up the reins, he is severely punished if he does not instantly stop and remain quiet. The horse is thus taught to know his master's wishes without the use of the whip, and indeed he is governed by the voice much more than amongst us; his harness is more simple, and blinkers are in a great measure dispensed with; by these plans much of the trouble and attendance that horses in England require is saved. Every farmer drives his pair or team as he calls it, but hardly any one thinks of hiring a man to look after them. In the Northern States you seldom see horses driven singly; a "one-oss concern" is there one of the strongest expressions of contempt.

A word now about farmer's tools. These, perhaps, do not equal ours in high finish, but excel them, I consider, in the high excellence of combining cheapness with efficiency; one of our largest plough manufacturers has acknowledged to me that he cannot compete in price with the American ploughs; and I think these catalogues of some of the principal American houses, which I will leave here, for the present, for the inspection of any one who may be interested in the subject, if compared with those of English houses, will show that American agricultural tools generally are cheaper than English ones. I know not why this should be, because, though it is true that wood is somewhat cheaper in America, yet all their steel comes from England, and is therefore correspondingly dearer; skilled labour, also, is more highly paid than in England, nor ought the difference in the price of wood to be very material, for the great houses in New York, Massachusetts, &c., procure most of their wood ready turned, or cut out, from establishments in Maine, and we might go to the same source for our supply.

I do not believe these tools are inferior in essential qualities to English tools, though in high finish they may be: at least as much steel is used in them as in the English implements, and the shrewd Yankee or Canadian farmer would soon find out the difference, and give the preference to English tools if they deserved it. The purchaser there is allowed to put an implement to any fair test he chooses before buying it; this fork, for instance, which is so light and handy, may be subjected to the test of swinging round and dashing it against the floor, thus. It cost one dollar—an English one, I suppose, would cost five shillings. Now I think two considerations go far towards explaining this greater cheapness:—one is, the great advantage taken of machinery in the manufacture—the second, the neglect of that high finish and polish of non-essential parts, besides, painting and decoration, which is carried to so superfluous an extent by our manufacturers, absorbs so much unnecessary labour, and is given solely for appearance sake. I am aware that an inferior and cheap class of tools is made for the colonial market, but I know, to my cost, that, in these, essential qualities are apt to be sacrificed.

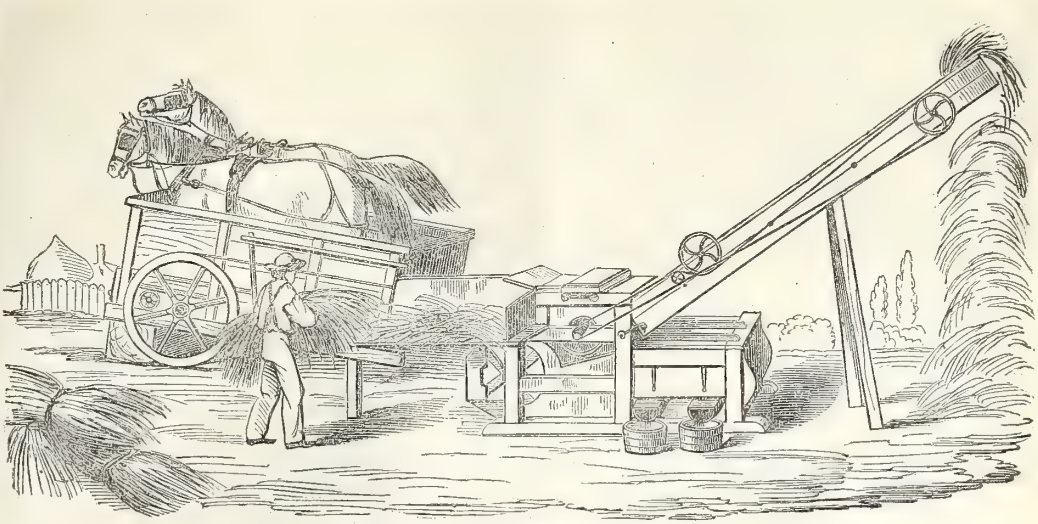
The wood-working machinery of America has, for some years past, excited the admiration of scientific men on this

side the water. It is too large a subject to enter into here, and indeed I have but to refer you to Messrs. Wallis and Whitworth's report on the Industry of the United States for information on that head, but I may say that all the woodwork on these tools is first steamed and bent into the proper curves, and then carved by steam into the requisite shape. This is done in great measure by Blanchard's turning process; the same process by which gun stocks, shoemaker's lasts, legs of chairs, &c., are shaped, and which has conferred on wood carving the same facilities of reproduction from one type, which the printing press has conferred on letters. It consists in using a pattern of the object to be made, and a tool with a double bearing, the butt end resting against this pattern, and the edge of course against the block to be carved, as each of these revolves in the lathe, the butt end of the tool follows the inequalities of the pattern and repeats them on the block. Then again dies are very much used for stamping out the metal. The tines of this fork are of one piece, stamped out by a die, which you see may stamp out two at one blow, which would fit into each other, like the fingers of ones two hands.

We are all familiar with American clocks, and know them to be capital time-pieces, though ugly enough; they furnish a good example and illustration of the remarks I have made; the brass works are all stamped out by dies, and in this manner they can be made so cheaply as to defy competition from this side of the water. The New Englanders are now carrying this plan to a certain extent into the manufacture of watches; and this machine-made watch, which you will allow is sufficiently ugly, is, I assure you, a very good time-keeper.

These offer a few examples of the great strides which the English race in America is making towards the emancipation of industry from merely mechanical employment, and I think it behoves English manufacturers to profit by such examples, for on the one hand a great danger, on the other a great and prosperous future, is opening before them. If they allow themselves to be beaten in the race by American ingenuity, they are in imminent danger of being supplanted, even in our own colonies, as well as in other distant markets of the world by their keen competitors; on the other hand, under the altered relations of the planting states of America, which form the Southern Confederacy, these great creditors of ours would naturally be inclined to come to our market for the supply of their mechanical wants, unless deterred by the dearness and unsuitableness of our goods.

I will now draw your attention to a few of their agricultural tools which present any noticeable difference from ours. I will not dwell on the reaping and the mowing machines, and the combined reapers and mowers, which would form subject enough for a separate paper. There is an endless variety of these, and a vast amount of ingenuity has been developed in their improvement. But I believe that not only may Scotland claim the merit of their first invention, but English makers have, after all, fairly taken the prize in bringing them to their present state of perfection, certainly in the opinion of English judges, and even in that of some Americans. These machines are largely used in the prairie states, but in some parts of the country they are scarcely seen, and this grain scythe and cradle is used instead. It is a very perfect implement of its kind, and to see a number of neighbours joining in a Harvest Bee to cut down the grain with this cradle is as pretty a sight as can be. It gathers in so much at each stroke that a couple of cradlefulls form a sheaf, which saves much of the labour of tying; when cut the grain is generally very speedily threshed out in the field, the heat of the summer climate, and consequent dryness of the grain admitting of this, and the power generally used for threshing it in the Northern States is this horse-power, the great advantage of which lies in its portability. It is called a railway, or an endless railway horse-power, and is used for most of the stationary work on a farm, threshing, winnowing, chaff, and corn stalk cutting, cutting up wood for fuel, &c. They are of various sizes, adapted for one or for two horses, or even for a sheep, a dog, or a calf, any of which, when put in, have no choice but to do their work, for it is a kind of treadmill. It consists of a pen, with a floor resting on an endless web, or else with the slabs of which it is composed merely jointed together, and running on rollers. When the machine is set at an inclined plane the animal's weight causes this floor to slide back, and motion is communicated from it to the axle of a driving-wheel; the motion is a constantly accelerating one, and checked only by the opposition of the *pièce de resistance*, in the shape of wood to be sawn, or other work, or by the application of a clog. That this application of power is not found to be cruel, or to distress or injure the animal, is certain, for the Northern farmers do not hesitate to put their driving horses into "the power." It is the most effectual method of applying a small amount of animal power, (that power which every farm must possess, and which there can be no economy in leaving unemployed, as is often the case, whilst all hands are employed in tending a steam engine,) to such purposes as threshing, winnowing, grinding, churning, sawing wood, and all others which require rotatory motion, because, in the first place, the speed of the animal is directly imparted, without the intervention of gearing, to the axle of the driving-wheel, whence, of course, it is multiplied at the periphery where the band travels. Here is a woodcut of this horse-power. The advantages claimed for these horse-powers over the old lever ones are:—1st. That in this the speed is directly applied to the axle of the band-wheel; in the other, the horse walks a circuit of some 18 or 20 yards, in order to give one revolution to the axle, and this loss of speed has to be recovered by a complicated system of cog-wheels and gearing. 2ndly. A horse walking in a mill pulls, not at right angles to the pole which forms the radius of the circle, but within the right angle, viz., in a straight line towards a point in the circumference a-head of him, hence the line of draught falls within the circle, and forms an acute angle with the pole; this involves a loss of power in duplicate proportion to his thus diminished distance from the centre of motion, because the power is not wholly lost, but is mischievously exerted in pressure on the centre, and consequent increase of friction. 3rdly. The tendency of the motion in the American machine is to be cumulative, *i.e.* constantly accelerating. Were it not for the resistance of the work, this acceleration would very quickly shoot the animal out of the pen backwards. Advantage can be taken of this to give a few seconds to get up speed. The machine can be stopped, and the animal rested, by applying a clog to the wheel. But, after all, the great recommendation of these powers is their portability. If a crop is to be threshed at a distance from the homestead, "the power" is put on wheels and drawn to the spot by horses, which when arrived there are put in to work it, or in rainy weather when neither horses nor men can get on the land, and the former would be eating their heads off in the stall, and the latter lounging in the barn, "the power" is put into this barn and set to a job of chaff or root cutting, wood sawing, &c. This is an advantage that I am sure farmers will appreciate. The well-understood economy of these powers has caused them quite to supersede the old lever ones on the smaller farms of the Northern States, for steam is but seldom used there. The roughness of the roads would prevent itinerant engines from travelling, and besides, it is quite an axiom amongst engineers there that less than 5-horse power in steam does not pay. Within that limit of 5-horse power, however, Ericsson's caloric engine is coming into great use, and is found very economical. On the large plantations of the south, and the extensive farms of the west, the old horse works are retained, because they admit of the application of a much larger amount of power for threshing, &c., than do these railway machines. The capacity of these is said to be, for two horses, about 175



Horse-power, with Thresher and Straw Elevator.

bushels of wheat a day, thrashed and winnowed, and the computation of cost is 2½d. per bushel. They are even used on railways to cut up the wood for fuel. I fully believe they would be found very convenient on our smaller farms, and in particular in the colonies, where steam is out of the question. I some time ago sent one out to Australia, and I believe they are coming into use there. If any of my hearers wish to see how they work he may see one at the livery stables of Mr. Yeoman, in Guildford-street, made by a Mr. Hartas, of Pickering, in Yorkshire, who has patented an improvement in the joints that connect the slabs forming the floor. I may add that these "powers" have been reported on favourably by Mr. Amos, the Consulting Engineer of the Royal Agricultural Society, who was employed by that Society to examine them. He assigned them a superiority of 16 per cent. over the lever powers, in the effective duty performed by each. That Report may be seen in the Royal Agricultural Society's Journal for 1859, Vol. xx., part 1.

The straw from the threshing machine is often conveyed to the rick by an endless band or web carried over a roller on the threshing machine, and another roller on the rick, and run by a belt from the horse-power, and the straw is thus delivered with the aid of only one man on the rick to distribute it. The cost of one of these straw deliverers is only about 15 dollars, £3. Now, I saw at the agricultural show at Warwick, an English machine for effecting the very same purpose, most elaborately, and no doubt beautifully, constructed, but costing £51. It is evident that whilst it would be economy to purchase the one, it would be the height of extravagance and folly to buy the other.

Another labour-saving implement, commonly used in some parts of the States, is the unloading fork, for raising hay to the top of a stack, or as in Pennsylvania, for storing it in the large German barns so common there. It is shaped like a rake with 4 tines, and is capable of raising a couple of cwt. at once, or a pair are used together, which will carry up 4 or 5 cwt. between them. A rope attached to this fork is rove through a block, generally a patent block, *i.e.*, one with friction rollers; the block is suspended by a tackle over the centre of the stack, the fork or forks are pressed down into the load, and when all is ready a horse attached to the other end of the rope moves on and thus swings the load up to the top, where it is deposited by twitching a cord which releases a catch on the rake handle, as it might be called. This is very simple, but may be better understood by aid of this model. The friction rollers round the pin of the block, besides easing the working of it, are a great safeguard against ignition, and I must observe, that there cannot be a better example of a labour-saving instrument than is afforded by these anti-friction blocks, which are so much more generally used in the American merchant service than in ours; it is the employment of these and similar contrivances for saving the crews' strength which enables the Americans to sail their ships more cheaply than we do, and so steal from us so much of the carrying trade of the world. The blocks are certainly dearer, but I should suppose the extra expense would be saved in one single voyage in men's wages.

The hay in New England is generally stored in what are called hay barracks, *i.e.*, under a moveable roof, which slides up and down between four poles, like the posts of a four-poster, and can be counter-balanced over these. This roof lasts for several years, and saves an annual thatching, it is also a most convenient covering in rainy weather during hay harvest. This kind of hay barrack, I may observe, is used in the north of England.

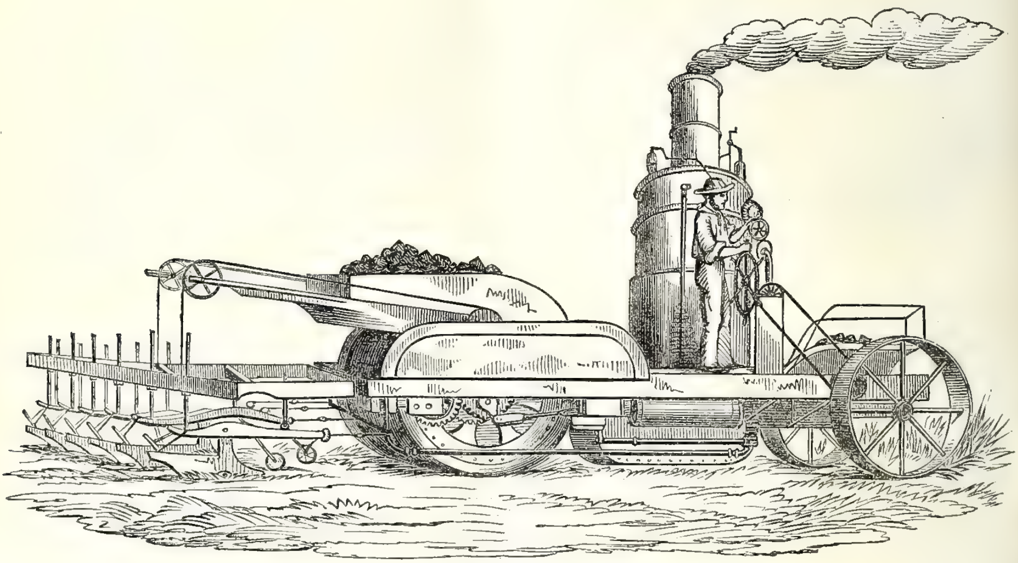
The ox shovel is another implement in great use, it is a cast iron trough like a coal scuttle, with handles like those of a wheelbarrow, and the traces are attached rather behind the centre so that when drawn forward, if the front edge catches the ground, it is pulled over. This implement is used in removing rubbish, dung-heaps, dirt, &c. A horse or ox being attached to it, the driver bears a little on the handles and guides it under the rubbish so as to fill it; as soon as he wishes to desposit the load he jerks up the handles, and the animal continuing to pull turns it over.

The potatoe digging plough is yet another simple but efficient implement, whereby saving of toil is attained, it buries itself well under the potatoes and turns them out, whilst the earth passes through slots in that which without these slots would be a double mould board. Now, undoubtedly, some potatoes are cut or left in the ground by an implement of this sort, but the saving of labour in a country where labour is highly remunerated is worth far more than the lost potatoes.

Here is a simple form of one or two horse mill, which is much used for coarse grinding, as for instance, grinding the corn cob and corn together for feed. It is of iron, with steel grinding surfaces, and is on the principle of a coffee-mill. It is said to grind about eight bushels per hour. I have here a section showing its construction. These might, no doubt, be made more cheaply in England than America, where

they cost 55 dollars=£11. I should like to recommend them to the notice of Birmingham manufacturers. I must remark here that this way of giving the cob with the maize for feed is much safer than giving the corn alone, for it is a heating food when unmixed. I am glad to see the importation of that valuable grain into England is annually increasing, but the precaution should be taken of mixing it with other food.

The subject of American ploughs is too large a one to enter on now; they would not do in England, but are better suited than the more expensive English ones to American requirements, and are therefore probably better adapted than ours for the work to be done in many of our colonies. Some of them were exhibited in the Exhibition of 1851; these catalogues show a great variety of patterns which are in vogue in different parts of the States; those in the Southern States are very primitive home-made affairs; in the German Settlements, the German left-hand plough is retained. In the Prairie States, generally, the whole share and mould-board are of steel, as iron will not scour in the tenacious alluvial soil, and would soon get clogged; but there is one kind of plough which I must draw your attention to—the prairie steam-plough—of which this is a woodcut. It is, you see, a locomotive



Prairie Steam-plough.

machine, not, like Fowler's, a traction one drawn by a fixed engine. It consists of a tubular engine, of about 18 horse-power, which acts, not on a pair of driving wheels, but, in their stead, on an iron cylinder, which is followed by a gang of six ploughs. The cylinder is about 6 feet in width, and 18 in circumference, studded with projecting knobs, to make it bite the soil. The tender, with coals, is placed over this cylinder, for the purpose of pressing these knobs into the ground, and obviating the danger of the machine being anchored by the ploughs, and the cylinder revolving in one spot. The knobs are so inserted as to be capable of being drawn back within the cylinder during its progress over roads—retractile, in fact, like a lion's claws. Arrived on the prairie, which, with all its tangled mass of grass and roots, is to be broken up for the first time since the creation of the world, the driver directs the engine by means of a tiller-wheel, towards some landmark far a-head. The cylinder rolls down the tall vegetation before it, and the six ploughs, placed diagonally, in the rear, tear up the sod and lay it over in six parallel furrows. Now this power-plough is not generally adopted in the West; the majority of the settlers are too poor to take advantage of such means; besides it has been invented too short a time (only two years) to be yet pronounced a decided success, but it is coming into use, and I know that the opinion of some of the most competent engineering authorities there is highly in its favour, as far as regards this sole object of tearing up the stubborn prairie sod for the first time. This is an exceedingly laborious operation, the resistance opposed by the stiff tangled mat of roots and grass being immense and worthy the intervention of the *Deus ex machinâ* in the shape of steam. When once broken up, the difficulty and the need of such powerful means cease, but there is still unbroken prairie soil sufficient to employ many of these ploughs for years to come. I will point out one or two of the advantages of this mode of ploughing; in the first place the work is done with great regularity by employing 6 ploughs in a gang, whereas, when such rough land is opened by a single plough, islands of unturned ground are left at every few yards. Secondly, part of the resistance is relieved by the rigidity of the machine itself; this may be best explained by a diagram. When a single plough passes through soil the resistance is necessarily distributed on each side, partly on the sod turned over, partly on the land-side; pressure and counter-pressure being equal, a large part of the force is absorbed in unprofitable friction on this land-side. But when six ploughs are driven in a gang rigidly fixed in a frame, I think it must be allowed that only a small proportion of the power can be absorbed and lost in this friction; this, however, is perhaps rather a question for an Agricultural Society to determine. But the great advantage of this plough in the far west, or any unbroken champaign country, consists in the immense saving of time and labour that it is calculated to effect. Quick and large returns are of course the great object of the settler's exertions, and one of these ploughs, hired for a few days, would prepare a larger extent of ground for crop then he and his boys could get ready during the whole of the sowing time.

I might mention other farm implements which display ingenuity and combine cheapness and efficiency, such as the automatic cheese press, in which the weight of the cheese itself is made to act on levers which give it the requisite squeeze; the Pennsylvania turn-over, or hill side

plough, a most admirable contrivance, the wooden turnover hay rake, &c.; but time is getting on and I wish to direct your attention to another class of objects, relating to the transport of produce and of passengers.

American railways for the most part, might be considered rude when compared with our highly finished and costly lines, but they are suited to the means of a young country, and are admirably adapted for opening up new districts, which would not have been opened up to this day if the costly system established in England, and that has been extended from England into some of our colonies, had been adopted there. How different would be the position of India at this time if the simple and rapid modes of constructing railways and opening river navigations, which have been so well proved in America, had been applied to the development of that country. It was stated by a speaker, at a public meeting in Calcutta in 1857, that California, within six weeks after its settlement, had in San Francisco more river accommodation for its export and import trade than Calcutta then had, after the undisturbed possession of a century.

American are, for the most part, single lines, the rails mostly English, but the locomotives and carriages are built there, and the material for bridges, stations, &c., is almost invariably the common product of the country, timber; consequently the cost of constructing these lines has been very small as compared with ours. The average cost of several, of which I have a list, was £8,000 per mile, yet the rails of these were chiefly of English iron. Here is a picture of one of their lattice bridges on the New York and Erie line, climbing up story above story-like scaffolding, of a regular and symmetrical form. The most stupendous lattice bridge in the world is on this line, at Portage, on the Genesee, but, being 800 feet long, and 234 feet high, I could not have embraced it in one view. These lattice bridges are most beautiful pieces of workmanship, and are constructed swiftly and cheaply, by the woodmen, of the pine timber, the tree here represented, which grows most usually at the stations where these bridges are required, viz., in the mountain ravines which they span. The logs are hewn down almost entirely with the axe. The bridges over the rivers also are almost invariably of wood, the roadway being suspended from arches formed of several concentric courses of timber, the joinings in the several courses alternating; they are of exceedingly bold spans, and that form of construction, you will observe, affords a clear unobstructed space between the piers for the passage of ice or drift wood in a swollen state of the stream. They are usually covered with a high pitched-roof, to prevent accumulation of snow, and boarded in for protection from weather. This form of bridge may be seen commonly in Switzerland and the Tyrol. The great danger to these wooden bridges, and particularly the railway bridges, arises from their liability to be burnt. Not a winter passes without the destruction of many of these by fire. The cinders and sparks from the engine fall into crevices, and it is almost impossible to extinguish the fire in winter when the water is all frozen at a temperature below zero. Not being an engineer, I cannot pretend to present more than a popular view of these and other engineering matters, and must once for all deprecate any severe criticism from professional men.

Now for the manner in which the foundations of these bridges are laid, and the piers built up. It is usually done by what is called in America, crib work, of which this is a rough model, and is effected in the following manner:—A survey having been taken of the contour of the bed of the river, a raft or barge load of pine logs is brought to the spot and four of them are formed into a parallelogram, cut away so as to be conformable to any inequality of the bottom; on these others are laid notched and fitted and securely bolted to them; a floor of stout slabs is laid across these, which is then weighted with stones so as bring it down to the surface of the water, this box-shaped pen is anchored on the spot selected for the pier, and the process is carried on of building it up, and as it rises sinking it with additional stones flush with the surface of the water till the bottom takes the ground; the interior is then filled in with stones, and a solid and very durable pier is formed, its durability being due to the valuable property which the pine possesses of remaining for a great length of time under water without decaying. Perhaps the turpentine and resin which it contains contribute to this durability, but our own elm, which contains no resin, has a similar duration under water, though it decays rapidly in the air. The logs of which these cribs are built, are roughly squared pine logs, and the whole workmanship is effected with no other tools than the axe, saw, and auger. Here you see there is no need of coffer-dam, or even diving-bell; the whole pier is built downwards from the surface, and of the most abundant and cheap materials, and yet it is very efficient and very durable, not difficult either to repair in aftertimes by building up a casing of logs, in the same fashion, outside the original one. Many of the wharves and jettys are built in this manner, in fact, it is a good instance of the rough-and-ready expedients for meeting pressing emergencies of which America offers so many examples well worthy of imitation by those who are placed in like circumstances. I cannot help thinking that bridges of this cheap construction would answer every purpose in many situations, even in England, and might be adopted to the great relief of county rates.

I will now describe the way they have of trans-shipping grain in bulk, though New York is not so good a place to see this as Buffalo or Oswego, or some primary grain port as Chicago.

We are all, I dare say, familiar with the little leather bands with caps, called a Jacob's ladder, which are attached to threshing machines for raising the threshed corn and pouring it into the sacks, and with the larger ones sometimes used in mills; the same contrivance on a large scale is used in America for raising the grain from the hold of a vessel, or barge, or a railway car, into the bins of a store, or for pouring it from one hold into another. You see along the wharves of Chicago, or Buffalo, or any great grain mart, a number of tall wooden towers with long wooden shafts dangling from them like a pump handle; if you watch them you will by-and-bye see a barge or a grain-schooner warp alongside, and this same pump handle rise over the bulwarks and dip into the hold just as an elephant might be supposed to dip in his proboscis. This wooden shaft you will then divine, contains an elevator, which consists merely of a number of little buckets, fixed on a belt, which is driven by steam. They dip into the grain and carry it up into the building, where they discharge it generally into a hopper, which, after receiving a certain quantity, lets it down into the bin or into a shoot, which discharges it straight into another vessel, at the same time ringing a bell, or moving an indicator; the grain is thus without more trouble measured off in transitu. Let us see now how this grain arrives at New York. Whether it be wheat or corn (by which they always meant Indian corn or maize), it is very probably grown in Canada or in the Great Prairie States of the West, Indiana, Illinois, Iowa, Wisconsin, &c., 800 or 1,000 miles west of New York. Whether it comes over land or water it is entirely dealt with in bulk. The low price which it bears would not admit of all the paraphernalia of bagging. It is conveyed from the farm to the nearest railway or canal in a box formed of tongued and grooved boards which form the body of the waggon; it is shovelled out into the barge at Chicago (we will say), run through an elevator into the hold of a grain schooner or propeller at a very trifling charge; these convey it through the great lakes, more than 800 miles in all of fresh water, to Buffalo. There again it is transhipped, or it goes on through the Welland Canal and Lake Ontario, 150 miles farther, to be transhipped at Oswego into the barges of the Great Erie Canal to Albany on the Hudson, whence it has to descend the river a distance of 150 miles, the lower part of which is a broad estuary several miles in width. How is this per-

formed? Why, 20 or more of the barges, each of which is a boat of 70 tons capacity, are formed into a raft, with a steam propeller in the middle, and the whole mass, like a floating island, undertakes its adventurous voyage to New York. This appears a dangerous enterprise, but I believe accidents are of rare occurrence. One passes a large number of these floating islands in steaming up the Hudson. The entire expense of conveying a bushel that whole distance thus, is only 7d.

The steam ferry boats, which ply in such numbers about New York, Philadelphia, &c., are constructed in the same manner as their river steamers. On a sharp, narrow hull is placed a platform, 50 feet in width, supported out on brackets, and extending to a line with the outside of the paddle-boxes, the paddles being of great width; on this platform are built two handsome saloons, the best being called the ladies' saloon, into which no man has a right to intrude, except in company with a lady; this precaution is necessary where republican prejudice does not allow of the distinction into first and second class. I assure you the ladies' saloons, in some of these boats, are most elegantly fitted up with mirrors and handsome furniture, and for all this splendour the fare is about 1d. Between these saloons is a gangway wide enough for a double line of carts and carriages. A platform, accommodating itself to the rise and fall of the water, enables you to drive on board with perfect ease, and the little dock into which the boat glides at each side is formed of piles, hinged on moorings at the bottom, which yield to the vessel like reeds as she enters, and prevent any violent concussion. These ferry boats are 100 to 120 feet long, and 50 wide. You see the pilot-house aloft and the walking-beam.

I have been asked why we have not such in similar situations in England; at Liverpool, and other places, it is a case of vested interests. The right of ferry belongs to a Corporation, forsooth, which has the privilege of preventing people from crossing in any boats but their own, so they have no interest in improving the transit. I have been reproached over and over again in America with our dilatoriness in adopting these and similar obvious improvements, and the only answer I could make has been that whenever any useful improvement is suggested in England, a lawyer stands in the way to uphold some ancient and time-honoured abuse.

The passenger steamers on the Hudson are very noble boats; but few of our ocean steamers surpass in size or power such vessels as the *Isaac Newton*, or *New World*, or *Daniel Drew*, which have a length of about 400 feet, and the same broad platform for a deck which I have described in the ferry boats, on which are built handsome saloons, fitted up with every luxury, so that the greater part of the space below deck can be appropriated to cabins and berths. Above all tower the paddle boxes, encasing the wheels, 45 ft. in diameter, (those of the *Great Eastern* are but 60 ft.) and between these moves up and down very leisurely the massive beam of the engines, commonly called the walking beam, from its peculiar movement resembling the act of walking or striding along. It must be remembered that each stride of this beam indicates an entire revolution of the great paddle wheel, but until I bethought me of this, there seemed a great disparity between the slow motion of the beam and the rapidity with which the great ship was shooting onward. You will observe the truss beams extending fore and aft; these are to support the great length of the ship, for without these a wooden vessel of such dimensions, so long and so narrow, would infallibly soon break her back. You will observe, also, the masts as they are called. These are not what we mean by masts, but are strong upright timbers, with chains passing over them, which help to brace the vessel together: they thus form part of the frame, whilst at the same time they are useful for flying the colours from.

There cannot be a better type of the go-ahead character of the Americans than these steamers. In descending the river with the current they often run a neck-and-neck race for many miles with the railway trains on the parallel line on the bank, having the advantage over the train of running a pretty straight course without following the sinuosities of the banks. You will observe the glass case on deck; it is the pilot house, placed here well forward and aloft, whence the pilot can see almost under the vessels bows, and steers by chains acting by a cross-bar on the rudder.

There are various other American inventions and appliances which I should have been glad to describe in detail did time permit, but the subject is far too wide and extensive to be embraced in a single paper, and I can only point to these diagrams on the wall, and assure you that I shall be happy as far as is in my power to answer any questions respecting them. They relate, as you observe, to docks, particularly the floating docks for which the Americans are famous; Derrics, such as have been seen of late years on the Thames. Unloading gear for shipping, railway engines and carriages, tramways and tramway cars, such as are now being proposed in this country by an American gentleman with the appropriate name of Mr. Train, (excellent things are these tramways for relieving the traffic of crowded cities): canal slides, and canal boats built in sections, steam boats, and pilot boats, &c.; and finally modes of house-warming adapted for very cold climates. Besides these, I have some little models and articles of household economy which I shall be happy to explain to anyone who may take an interest in them. I must not trespass longer on your patience, and only regret that time does not admit of full justice being done to my subject.

DISCUSSION.

Mr. E. Chadwick, C.B., would offer his congratulations on the advance shown by the fact that here was a travelling Fellow of Oxford bringing home, not the means of fostering an indolent architectural copyism by the display of the symbolism of effete paganism, not mere dead matter of happily bygone times, dug up for the literary recreation of the cloistered few, but sound practical information, for the advancement of the productive arts, contributing to abundance amongst the many,—useful information, not concealed in the dead Latin language, as required from the travelling Fellows of Cambridge, but given clearly in the vernacular. With the thanks of the meeting for this important example, might be coupled a suggestion to the University authorities, that if there were, as it was to be hoped there might be, more such Fellows collectors of nationally useful knowledge, this Society would be a place, and this a mode of displaying it, for the advantage of the public in England, our colonies, and the credit of the University. Of the general matter introduced into the paper, that which adverted to the education of the American population, as one proof of the progress of the Arts, was at this time deserving of more extended attention. The like testimony to the beneficial operation of education, in promoting the Arts in America, was borne by Mr. Whitworth when he acted as a commissioner from England at the American Exhibition held at New York. To the better education and greater intelligence of the work-people, he ascribed the fact that they understood the advantages of machinery in relieving them from the drudgery of manual labour, and that strikes to resist its introduction were unheard of. Two elements, however, combined in America for the extension of labour-saving machines. One was the scarcity and the high price of labour; another was the training of the population arising from the circumstances in which the people were placed, as well as from their school education. He (Mr. Chadwick) was always favourable to advances in wages, even to heights deemed considerable, and for this reason amongst others that it was the only means by which inventions in the arts and labour-saving machines

could be brought rapidly into general use. Nearly a quarter of a century ago the successful working of the reaping machine had been demonstrated in action to intelligent men; but intelligence did not alone suffice. It was only the necessity occasioned by scarce or high-priced labour which led the agricultural mind to look seriously and practically to the means of saving labour. In respect to book instruction, American educational reports showed that a large proportion of these schools and those in the remote districts especially, were as bad in all respects as any in this country, and it might be doubted whether their best schools came up to our best schools. But the American children were earlier made to shift for themselves; to ride and drive earlier, and were made handy in domestic service where labour was scarce. Educational reports shewed that in many districts their school attendance was interrupted for long periods, and was on the whole less, yet their intelligence was declared to be on the whole greater. Let them compare the condition of an English lad at school, at desk work, all day long up to his thirteenth or fourteenth year, with that of an American lad who had been a much shorter time at school, but who had been obliged to use his hands and faculties in driving, or riding, or in work in the fields, although he might have had less schooling during the same time. He would repeat what he had ascertained upon the authority of machinists of long experience and observation, that there was in agriculture as much good invention unused as any that was in use, but it was unused mainly from ignorance combined with clumsiness, ineptitude, and incompetency to use it. Upwards of six thousand lives were lost every year, chiefly by the inept use of steam and other machinery. But witnesses had declared to him that the majority of the accidents arose not simply from the want of the intelligence imparted by common book instruction, but from bodily ineptitude and clumsiness. Untrained men—he meant bodily untrained men—were dangerous for trained men to act with. They did not pull together, or lift together, and hence serious danger arose. Now it was proved in respect to what were called half-time scholars, that those who were only half-time in school and half-time engaged in some manual or industrial occupation, in which they had to act as well as to think, or who were under some physical training, such as the excellent physical training of the naval and military drill, acquired precisely that sort of handiness and practical intelligence which was ascribed to the better class of native American artisans. These qualities of the English half-time scholars taught in the larger British or good National Schools, were so marked in Rochdale as to occasion them to be preferred by machine makers and others, not only to the pupils whose whole time was given in the same schools to book instruction alone, but to those youths who received the more expensive middle-class education in the country, and who were offered by their parents with premiums. These latter required more trouble to guide their hands and train them to act, as well as to inform their minds. The book instruction of the half-time scholars was proved to be equal, paradoxical as it might seem, to that of the full-time scholars, whilst their aptitude in applying it was greater. The evidence collected on these points, as a large and distinct educational question, should be well considered. From that evidence, when duly promulgated and considered, it would, he believed, be seen that to obtain due progress in the perfection and general use of labour-saving machines in England, it would be requisite to ensure systematised bodily as well as more practical mental training, such as were extensively imparted, without system, by circumstances and conditions in the United States.

Mr. S. Sidney said the few observations he would offer would be confined to the agricultural portion of the subject brought before them in the paper. It was impossible to overestimate the advantages which the agriculturists of this country had derived from the ingenuity of the Americans. If by the Exhibition of 1851 they had gained nothing more than the introduction into this country of the mowing and reaping machines, it was an advantage to the nation, the value of which it was impossible to overestimate. But, considering the various agricultural implements in use, it was necessary, in order to do justice to both countries, to regard the different conditions under which such implements were employed here and in America. With regard to the mowing machine, he had heard it asserted that it was invented more than twenty years ago; he believed that it was nearer thirty years ago since Mr. Bell first invented a mowing machine; but he doubted whether that implement had much resemblance to the machine which was most in use at the present time. Mr. Bell's machine, however perfect in itself, was not used in this country for a considerable period, for the best of all reasons, that we did not want it. Machinery would not be adopted as long as there was manual labour available to do the work equally well and equally cheaply. At the time the mowing machine was first invented labour was cheap; a large number of men could be obtained at any moment, and for very low wages, to get in the crop, and when the harvest was over they could be discharged. Under such circumstances occupiers of land were not likely to embark in an expense of £30 or £40 for a mowing machine. There was another reason why it had not been more generally used. Mr. Crosskill, who had done most to render the machine fitted for use here, had stated that the original machine could only be used with advantage on level surfaces, and therefore the American invention had to undergo considerable modification to render it fit for general use in this country; added to this our crops were heavier, and our roads better. In the early state of society in America, the great point was to get the machinery made as cheaply as possible. The crops were light, the roads bad, and it was of little consequence if the implement lasted only for a short time; but in this country the crops were so heavy that scarcely any of the machinery that came from America was sufficiently strong for practical purposes here, while the goodness of the roads rendered it worth while to make a more finished and durable machine. The same remarks equally applied to the threshing machine. When the American machine was put to work in this country, from the crops being so much heavier, it broke to pieces; and that which was a good and cheap machine for America was a very dear one for this country. The introduction of the reaping-machine was followed by that of the mowing machine, and he must say, so far from agreeing with the remark in the paper, that there was a disinclination on the part of the agriculturists of this country to adopt inventions that were really useful, nothing, in his opinion, was more astonishing than the avidity with which they were taken up as soon as they were proved to be practically valuable. Having been in Dorsetshire during the last harvest season he was astonished to see the extent to which the reaping machine was used even in the most retired districts of that county, and it was the same all over the country. In a recent discussion at the Farmers' Club, it was stated by a large farmer that, so far from the agricultural labourers looking upon the reaping machine as an enemy, they regarded it as a great friend. But when they came to speak of ploughs, a much larger question was opened up, and upon that subject he must be permitted to remark that he thought Dr. Eddy was not so familiar with the manufacture of agricultural implements in this country as in America. Twenty-five shillings was by no means a remarkably low price for a plough. They could get ploughs in plenty at twenty-five shillings each, and there was a very large business done in this country in the export of the "guinea plough." Dr. Eddy, in a communication to the *Journal of the Royal Agricultural Society* made a comparison between the £4 and the £2 ploughs; but under some circumstances the £4 plough was the cheaper implement. The American plough was suitable for that country, where they did not care about a thing lasting long; but it had yet to be shown that those implements could be used with

advantage in this country, where durability was considered. At the Agricultural Exhibition at Vienna, a large number of ploughs from different countries were exhibited by Mr. Smallbones, and the result of trials of the different implements amongst the German and Hungarian farmers, was to give a strong preference in favour of the English plough over the American. They found it altogether a better and more convenient implement for the circumstances of the country. This was a subject which must be considered entirely with reference to the circumstances in which they were placed, and they must not be too much carried away by the idea of cheapness; nor must the class of machines constructed in this country to suit the tastes and ideas of wealthy amateur farmers, who would not fancy a thing unless it was costly, be taken as fair specimens of the machines used by the generality of our tenant farmers. The best proof of the readiness of that class to adopt really valuable inventions was afforded by the extent to which steam cultivation had increased in this country. Steam ploughs could not be made fast enough to keep pace with the demand for them. Some remarks had been made in the paper upon an agricultural fork, but he did not know what were the peculiar merits of the implement introduced that evening. He had been familiar with that description of fork for many years, and he believed both forks and axes were made in Sheffield cheaper than in America, and of equally good quality. A large customs duty had excluded many of our steel manufactured goods from America, which was a proof that our neighbours considered we could produce as good an article as themselves. Parkes' steel fork had received the premium of the Royal Agricultural Society, 14 or 15 years ago, and had rapidly grown into favour. With respect to the horse threshing machine, described in the paper, its great practical value could not be disputed; but, in this country, steam was so easily available, owing to the good roads for the transit of machinery, that the steam threshing machine could be hired and the work executed in a short period of time, and at a remarkably cheap rate. With regard to the educational considerations touched upon by Mr. Chadwick, there could be no question that the time was come when they should give education to the agricultural class, which would be useful to them in the occupation they were destined to follow. No doubt one great difficulty in the introduction of new inventions was that of getting the workmen to understand them, but in this respect it was gratifying to observe that great improvement was taking place, as was evidenced by the fact of the large number of agricultural steam engines that were now in use in almost every part of the country.

Mr. Dennis begged to take exception to the remarks of Dr. Eddy upon one subject treated of in the paper, that was with regard to Ericsson's engines, which had been spoken of as being efficiently employed in America. So far as he had seen the operation of that engine, he considered it a decided failure. On the occasion of an experiment with this engine which he had witnessed, after very considerable delay in getting it into action, a ten-horse engine could only be got to work up to half-horse power. Messrs. Ransome and May had one of these engines from America, but they could make no practical use of it. He felt it his duty to make these remarks, in order to prevent misapprehension on the subject of these engines.

Mr. Wm. Hawes remarked that the paper they had heard assumed that everything in America was both cheaper and more economical than corresponding machinery in England. Dr. Eddy appeared to have given attention to these subjects in America which might have presented some degree of novelty to his mind, but it would seem he was not quite so familiar with the circumstances under which similar machinery was applied in England. A few years back Mr. Holmes, the American Consul at the Cape of Good Hope, was the first to import agricultural machinery to the Cape, with a desire to cultivate improvements in mechanical appliances in the place of hand tillage. He introduced the American plough, at prices varying from 20s. to 30s. and 40s. each. For a time they had a great run, but within the last few years the English plough had been substituted. It was dearer, but stronger and more useful; and he believed was found to be more economical than the cheap, weak, imperfect, American implement. That the American plough was got up very nicely indeed for the price he had no doubt, but he had been told by an experienced farmer that it was a great deal too weak for the work it professed to do, and even by no means an economical implement. In looking at the diagrams he was struck with one character which pervaded the whole. If the real object of machinery was to be as perfect as possible, that the greatest economy should be derived from the use of it, they must be struck with the fact that these appliances were such as were suited to a rough and primitive state of society in a new country, and not to such a country as England, where there was great scope for the display of ingenuity, and where, also, they had a choice of means for the accomplishment of a particular purpose. In the American machinery described that evening there was a display of considerable skill and inventive power, but it was not adapted for use in England without further improvement. His friend Mr. Chadwick had accounted for the mechanical genius of the American people in rather an extraordinary way. Coupled with the scarcity of manual labour, he had held that one of the reasons why we had not been so ready to introduce machinery was that the children in America were not kept so long a time at school as in England.

Mr. Chadwick said he had been misunderstood.

Mr. Hawes was glad to find that he had misunderstood his friend, inasmuch as when their present endeavours were directed to induce parents to continue their children at school for as long as possible, he was somewhat startled to find a champion of education ascribe the progress of invention in America as resulting from the children being thrown earlier in contact with the world and mechanical labour than was the case in this country. There was another view of this subject, which must strike everybody,—that was, if all these machines were so much better than those we had in use here, there must be great ignorance amongst our machine makers and farmers in not adopting them. But what was the fact? He believed the increase, both in the number and establishments of agricultural implement makers, had been greater of late years than in almost any other branch of manufacture in this country. But had they gone in the direction of cheaper and inferior machinery? On the contrary, there was greater perfection in the machinery than ever. Therefore he thought there was something wrong in the idea that American machinery, simply because it was rough and cheap, was more suitable than that now employed in this country. He, however, felt indebted to the learned Fellow for the paper he had brought before them. He hoped he would excuse this passing criticism; for, although he was not himself an agriculturist, he could not help expressing what he thought was a common sense view of the subject which had been laid before them.

Mr. John Cassell thought Dr. Eddy was labouring under some misapprehension with respect to the cost of production of implements of this description in America. He had recently paid a visit to that country, and had travelled some thousands of miles over it during his ten months stay there; and it was his opinion, as the result of his own observations, that if we were more fairly dealt with as a nation by the American government, instead of the people being dependent upon American manufactured tools, they would be large importers of those articles from this country, both in iron and steel. What had been the policy of America in this respect? When he was there, any article of this description could not be introduced, except by paying a duty of 24 per cent., which enhanced the price from 40 to 50 per cent. above what the article could be procured for in England. What had the American government recently done? Seeing that our exports from Sheffield and

Birmingham were very considerable, they had altered their tariff to an extent which was almost prohibitory. Some articles of iron paid a duty of 40 to 50 per cent., whilst on some steel goods the duty was as much as from 50 to 250 per cent. Under such circumstances it was not to be wondered at that they could compete with the manufacturers of Great Britain. He had directed his attention to the circumstances in which America was placed with regard to labour. The natural resources of America were great, and any one who engaged in agriculture there was sure to get a large return for his labour; but the policy was to enhance the price of labour by the heavy duties imposed upon imports of manufactured articles. In the matter of clothing this was especially the case. A pair of shoes which could be purchased for 11s. in England would cost 20s. in New York. They imposed these high duties as a protection to native labour, and they would not allow it to go to develope the resources of the country as it would do if there was a free exchange of commodities between the two nations. He thought great good would result from the paper they had heard that evening, and gentlemen who visited America would confer great benefit by communicating the various appliances for saving labour which had come under their observation. He was much struck, on visiting an American homestead, at seeing the various labour-saving appliances for domestic purposes. There was a machine for sweeping a carpet and gathering up the dust in an effective manner. There were also appliances for making puddings; and last, though not least, there was the almost universal sewing machine. In the printing establishments of America especially, labour-saving machinery was considerably in advance of anything in this country. There were printing machines with appliances both for laying on the sheets and taking them off when printed, which was done by boys in this country. He was particularly struck with the book-binding establishments. Piles of books underwent the process of having the edges cut whilst the attendant upon the machinery was preparing another pile for the same operation. Again, the mechanical appliances upon the railways were particularly worthy of remark. He had traversed once the Alleghany mountains by railroad, at an elevation of 2,000 feet, without separation of the carriages, the journey being accomplished with rapidity and a great sense of safety up very steep gradients. His principal object in rising was to correct an erroneous idea with regard to the power of America to produce tools and implements superior to those of England. From his own observations, he believed the English could beat them hollow if the American Government gave a liberal tariff, in the place of the exclusive, selfish, and, in his opinion, hostile tariff which had lately been introduced; and we should largely import the agricultural produce of America, and pay them back in our manufactured goods —in good tools, good implements, and good machinery.

Mr. John Anderson had given some attention, during a visit to America, to the labour-saving appliances in use in that country. He had listened to this paper with great interest, but there were always two sides to a question. In many branches of industry there could be no doubt the Americans had gone a long way ahead of us, which had, in a great measure, arisen from an inordinate demand for a particular article. In almost every instance in which they had surpassed us in the manufacture of the same description of article it was in cases where it was required to be produced in great numbers, and to such productions a large amount of mechanical ingenuity had been directed. This was especially the case in the manufacture of the particular kind of clock for which America had become celebrated; also in articles of chairs or bedsteads, as many as 500 or 600 a day being turned out in one place; and these articles being produced with an amount of mechanical ingenuity and with a reduction of cost which had rendered the manufacture a great sucess. He was also struck with the appliances for carrying out the copying principle in various branches of industry—the principle of producing a form from a copy. Whilst there, he had attributed many of the inventions he saw to American origin, but when he returned home he found that many of the appliances now developed in America had been previously introduced in this country. This remark was particularly applicable to Blanchard's gun-stock machinery and other things, the germ of which was to be found in the block machinery which had been in existence at Portsmouth as far back as the year 1803. Most travellers in America had been struck with the great progress that had been made in working in wood. That was a large question, which time would not then admit of his entering upon, but passing on to iron he would say, notwithstanding the great advances which had been made by America in the production of articles in iron of complicated pattern and workmanship, he would say the iron manufacturers of England were very far in advance of those of America; and if they were to compare a large and well-conducted engineering establishment in New York with such a one as that of Messrs. Penn, at Greenwich, the difference was extraordinary in the amount of work done. The whole of the machinery for the manipulation of iron that he saw in America was far too light, and the lathes, &c., when compared with those in England, were mere playthings. In the matter of the organisation of the workshops, he thought the Americans were in advance of us, in order, system, and in the general intelligence of the workmen, and more especially in the dissatisfaction on the part both of masters and workmen with present attainments.

Dr. Eddy, in reply upon the discussion, said in reference to the remarks of Mr. Hawes, he had distinctly stated that the majority of the appliances he had described were more fitted for introduction into our colonies than for use in this country. He was not aware that he had alleged that the American machines were better made than the English. What he said was, that some of the contrivances, he considered, were applicable to the wants of this country, especially the steam-boat ferries, and the horse-tramways, which had already been introduced, and were favourably spoken of. With regard to the generality of the agricultural implements, he had mentioned them as more suitable for use in our colonies. He was glad to hear from one of the speakers that English ploughs competed successfully with the American in foreign markets, which was a fact new to him altogether. In the manufacture of the steel fork for agricultural purposes, he thought the Americans were in advance of us in their plan of stamping it out of one piece of metal, which must produce a stronger article than when made of many pieces. With regard to Ericsson's engine, he had mentioned it as principally employed for pumping and hoisting purposes, and he believed, for low powers, it was found to be exceedingly useful.

The Chairman was sure the meeting would concur in expressing how much they were indebted to Dr. Eddy for the interesting paper he had brought before them, which, in many of its characteristics, presented features of novelty. With respect to what had just fallen fallen from Dr. Eddy, a memorandum had been put into his (the Chairman's) hand, of which, as members of this Society, they ought not to lose the record. It was to the effect that, in 1848, these forms of forks and ploughs were brought over from America by Mr. Slocomb, and the Society's medal was awarded for their introduction. They would be glad to find that the Society had been in the habit of rewarding those who introduced into this country any valuable invention which we did not formerly possess. He would have wished this discussion could have gone on longer, and that Mr. Anderson had felt himself at liberty to have extended his remarks, as he was probably prepared to have done; and he hoped he would supply the deficiency by giving them a paper at some future time, because, however valuable the paper was in itself, the discussion frequently greatly added to the light that was thrown upon the subject. He thought it was only due to the author of the paper to say that he never understood him to imply that we, as manufacturers,

could not compete with and beat the Americans, or that our implements when made were not better for the purposes they were required for than those of American make. But what struck him as being the spirit of the paper was, that owing to the state of things in America, not so much owing to the necessity for saving labour, as to the general feeling that men were not satisfied with things as they were, owing besides to the state of education and society there, they were prone to look-a-head and seek for improvement. He thought to that state of things, as much as to any other, was due the fact that the germs of many great improvements had come from America. This was particularly the case in the printing machines. They had lately heard a great deal of the sewing machine. What a wonderful social reform they might look forward to from that interesting American production; not but what, if they searched the records of the Patent Office in this country, they might probably find the germs of that invention. He had the good fortune to be in New York at the time of the great Exhibition there, and he was struck with the great amount of novelty in many of the machines exhibited. There were machines for almost every domestic operation, amongst which he remarked an apple-paring machine, by means of which thousands of bushels of apples might be pared by steam machinery. Then, again, there were the washing machines, which he believed were of American origin; in fact, there was scarcely any operation connected with the domestic arts to which machinery had not been made applicable. He could not help feeling, during the reading of the paper, that there were many matters in which they might take example from their excellent cousins—particularly with regard to ferry boats and river steamers. At the present moment there was hardly an instance of accommodation in this country, in the steam boats, equal to what they obtained for a penny in America, and the cabins of our river boats were a disgrace to the present civilised age. The only exception to that state of things that he was acquainted with, was in the case of the ferry boats lately established between Tilbury and Gravesend, where the cabin accommodation was of a better order. There was one matter of peculiar interest mentioned in the paper, that was, that, in America, efforts were being made to replace the cumbrous water-wheel by the turbine. That had been a matter of considerable interest and discussion, a paper upon it having been read before the British Association, and it would be gratifying if it should lead to a more economical application of water-power than was at present in use. He was glad to find that, although Englishmen had hitherto been somewhat badly treated in America as to the matter of patents for inventions, that injustice had at length been done away with, and an Englishman could now obtain a patent upon the same terms as a native of that country. Americans had long looked upon English patents as most valuable property; but it was to be remembered that patented property was better protected in America than in this country, from their entertaining more just views of the rights of labour than was the case in England; and he trusted America and England would derive mutual advantage from the more liberal policy which had lately been adopted. He begged to propose a vote of thanks to Dr. Eddy for his valuable paper.

The vote of thanks was then passed.

The Paper was illustrated by a large number of models and diagrams of the various machines and appliances described by the author.

The Secretary announced that on Wednesday evening next, the 10th inst, a Paper by Dr. Milligan, "On the Products and Resources of Tasmania," would be read.

Home Correspondence.

ARRANGEMENT IN THE FORTHCOMING EXHIBITION OF 1862.

Sir,—I was not able to be present at the meeting, on the 13th March, when Professor Ansted's paper was read, but as the subject is one which cannot be too much ventilated at the present moment, and as the company with which I am connected are intending exhibitors of one of the manufactures more particularly referred to, perhaps you will find room for the following brief remarks.

In the first place, while full sympathising with the Professor's desire to have a well-digested plan, I must entirely demur to his suggestion that it should be carried out by officers appointed by the commissioners. One of the speakers in the discussion which followed, fully and truly represented the general feeling of the manufacturers, when he said that the "sort of despotism alluded to" would not be submitted to. What we want is, that a plan should be settled, within the radius of which each manufacturer should be at liberty to act as seemeth best to him. Suggestions would receive every attention, but instructions would be ill received if they entered into too much minutiæ.

Professor Ansted's suggestion that mineral manufactures should be exhibited in conjunction with the raw material from which they are produced, will, I think, meet with very general approval. Doubtless such an arrangement would add vastly not only to the attraction, but also to the instructiveness of the Exhibition, and I quite agree with him that the plan presents no insuperable difficulties. Class E, in which it is proposed to exhibit minerals forming the essential ingredients of the accompanying specimens of manufacture, appears at first sight surrounded with difficulties. On consideration, however, these vanish; take, for instance plumbago crucibles (alluded to by the professor), and in which I am more particularly interested. Here we have an article manufactured of about three parts plumbago and one part clay. It is our intention to exhibit the raw material plumbago in its natural and prepared states, in conjunction with the manufactured article, crucibles. We also propose to exhibit a sort of epitome of the other materials employed in conjunction with plumbago, so that those interested may see at a glance the entire component parts of the finished crucibles. The remark that "careful lists of desiderata should be prepared beforehand, and direct solicitation made in the proper quarter for the particular object required and no other," appears to me highly important. The Exhibition should not be a bazaar, where anyone may show what he pleases, but, as far as possible, a collection of the productions of the first manufacturers in each department, and this can only be brought about by direct personal solicitation. Here is an opening for the competent persons alluded to in the paper. Instead of arranging for the various exhibitors, let them enter into arrangements with those parties. We are all willing to be aided, while objecting to be drilled. The question of keeping together the productions of each nation, &c., and many others, touched upon in the paper and discussion, merit the consideration of all who feel an interest in the forthcoming Exhibition, and will. I hope, now that the subject has been fairly broached, be discussed in the *Journal*. I am, &c.,

T. V. MORGAN.

Patent Plumbago Crucible Company.

THE UNITED STATES PATENT OFFICE OPEN TO EUROPEAN INVENTORS.

Sir,—As your *Journal* circulates among inventors in all parts of the British Empire, it is a suitable medium for announcing that English and other European inventors are now admitted to the privileges of the United States Patent Office on equal terms with American citizens. Hereafter, patents are to run seventeen years instead of fourteen, but are not subject to renewal. The specifica-

tions are to be printed, which, being duly certified, are to be taken as evidence in the courts. Inventions which have been patented in other countries cannot be patented in the United States after any other foreign patent shall have expired. Inventors, therefore, should procure their patents first in the United States, except in cases where such prior obtaining of an American patent will invalidate a patent proposed to be granted subsequently in some other country.

By an inadvertance in the framing of the Act, ornamental designs are excepted. No patent can be granted to aliens unless they shall have resided one year in the United States, and taken oath of their intention of becoming citizens thereof.

A uniform charge of seven guineas (thirty-five dollars) is the only fee; all discriminating fees are abolished.

Labour-saving inventions will find ready acceptance there, the more, perhaps, as the unwise tariff just enacted may give a fresh impetus to domestic industry. In condemning my countrymen for their impolitic tariff before the British public, I may not do so without a word of animadversion against the charge of 100 per cent. to which tea is subjected in this country, which, both in a sanitary and moral point of view, is to be deplored, and perhaps commercially also.

Now that justice has been done by the United States to foreign inventors, there is reason to hope that authors may not long be defrauded by the absence of an international copyright bill. I am, &c.,

D. J. MACGOWAN.

12, Regent-square, W.C., April 2, 1861.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Royal Inst., 3. Prof. Helmholtz, "On Musical Acoustics."
United Service Inst., 7½. Captain E. P. Halsted, R.N., "Iron Clad Ships."
British Architects, 8. Professor Willis, F.R.S., "On the Architectural History of Chichester Cathedral, and on the Fall of the Tower."
Royal Geographical, 8½. 1. "N.W. Australia, Report on the Organisation of the Exploring Expedition from Perth to the N.W. Coast of Australia;" by Mr. F. T. Gregory. 2. "N.E. Australia, Memoranda on the Ports of," by Mr. A. C. Gregory; with "Report on the Exploring Expedition to the River Burdekin;" by Mr. J. W. Smith, R.N., communicated by Sir George Bowen, Governor of Queensland, through the Duke of Newcastle. 3. "S. Australia, Expeditions in;" by the Governor, Sir R. Mc Donnell, and Major Warburton. 4. "Latest News from the Expedition to the Sources of the White Nile; under Captains Speke and Grant."
Medical, 8½. Clinical Discussion.

Tues. ...Royal Inst., 3. Prof. Owen, "On Fishes."
Syro-Egyptian, 7. Anniversary, 7½. Mr. R. C. Marsden, "Some Remarks on Cartouches of Egyptian Kings, according to Mr. Sharpe's List."
Civil Engineers, 8. Continued Discussion upon Mr. Murray's Paper, "On the North Sea."
Medical and Chirurg., 8½.
Zoological, 9.

Wed. ...Literary Fund, 3.
Royal Inst., 3. Prof. Helmholtz, "On Musical Acoustics."
Archæological Assoc., 4. Anniversary.
Society of Arts, 8. Dr. Milligan, "On the Products and Resources of Tasmania."
Geological, 8.
Graphic, 8.
Royal Soc. Literature, 8½.

Thurs...Royal Inst., 3. Prof. Tyndall, "On Electricity."
Royal Society Club, 6.
Philological, 8.
Artists and Amateurs, 8.
Royal, 8½.
Antiquaries, 8½.

Fri. ......United Service Inst., 3. Major Miller, R.A., "The Italian Campaign of 1859." Part I., General Account.
Astronomical, 8.
Royal Inst., 8. Prof. Helmholtz, "On the Application of the Law of the Conservation of Force to Organic Nature."

Sat. ...Royal Inst., 3. M. Max Muller, "On the History of Language."
Royal Botanic, 3¾.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, March 22nd*, 1861.]

Dated 11th March, 1861.

596. J. C. Fisher, Padfield, Derby—Imp. in machinery or apparatus for preparing and spinning fibrous materials.
597. J. Bunnett, Deptford, Kent—Imp. in the manufacture of bricks and tiles, and in machinery for that purpose.
599. A. Myers, Hutchison-street, Houndsditch—Imp. in the manufacture of boots, particularly adapted for ladies' wear.
600. G. Williams, Park Nook, Quorndon, Derbyshire—Improved apparatus for arresting the progress of railway accidents.
601. J. H. Johnson, 47, Lincoln's-inn fields—Imp. in life belts and swimming belts. (A com.)
602. J. T. Hutchings, Charlton, Kent—Imp. in the manufacture of of boots, shoes, and other coverings for the feet, and in tools for cutting the soles of such articles.
603. W. Tillie, Londonderry—Imp. in machinery for making frills.
604. J. Hirst, jun., and J. Hollingworth, Dobcross, Saddleworth, Yorkshire—Imp. in means or apparatus employed in weaving.

Dated 12th March, 1861.

605. J. Tomlinson, Kegwork, Leicester—An improved buckle plate or apparatus used for attaching and detaching horses when in harness, or for other purposes to which the same may be applicable.
606. A. S. Stocker, Wolverhampton—Imp. in the manufacture of rails for railways.
607. T. F. Griffiths, Birmingham—Imp. in machinery for raising or shaping metals.
608. A. Aerts, Place Verte, Anvers, Belgium—Imp. in apparatus for lubricating the moving parts of machinery.
609. E. Frementin and M. Aubonnet, Bordeaux—Improved apparatus for cutting wood for lucifer matches.
610. G. L. Ripamenti, Bordeaux—Imp. in the nautical compass.
611. W. Perry, Wednesbury, Staffordshire—Certain imp. in the manufacture of gun barrels.
612. R. H. Gratrix, Salford—Imp. in dyeing and printing textile materials and fabrics.

[*From Gazette, March 29th*, 1861.]

Dated 17th December, 1860.

3090. J. G. Taylor, Paris—Imp. in dress and other fastenings, and in the application and manufacture thereof.
3100. J. G. Taylor, Paris—Imp. in the manufacture of boots and shoes, and in the method of measuring the human foot for fitting the same.

Dated 5th January, 1861.

38. J. Roberts, Upnor, Kent—An improved warming hassock or footstool.

Dated 21st January, 1861.

158. F. W. Perrott, Hanover-cottage, Hanover-street, Walworth—An improved lubricating grease or paste for railway wheels and all kinds of machinery.

Dated 20th February, 1861.

420. T. Holstead, Botchergate, Carlisle—Imp. in apparatus for the manufacture of certain articles of confectionery and biscuits and other articles from plastic substances.

Dated 21st February, 1861.

438. H. P. Ribton, Dublin—Imp. in safety apparatus for lighting mines.

Dated 25th February, 1861.

474. J. Pinchbeck, Russell-street, Reading, Berkshire—Imp. in glass water-gauges and pet-taps of steam boilers.
484. J. Howard and E. T. Bousfield, Bedford—Imp. in the construction of windlasses, and implements applicable to steam cultivation.

Dated 9th March, 1861.

591. B. Walker and W. Tilson, Lenton, Nottinghamshire—Imp. in machinery or apparatus for the manufacture of bobbin net or twist lace.

Dated 13th March, 1861.

613. G. Spencer, 6, Cannon-street West—Imp. in india rubber springs for railway and other uses.
614. J. Farren, Clapham, Surrey—Imp. in preventing incrustation in steam boilers, in tanks for containing the feed for the same, and in bars for the furnaces thereof.
615. A. Peek, Manchester—Imp. in treating or preparing textile materials and fabrics.
617. D. Hebson and W. G. Ramsden, Liverpool—Imp. in apparatus for obtaining fresh water from salt water.
618. W. Walker and D. Walker, Lindley, Yorkshire—Imp. in machinery for producing rovings or slubbings of wool or other fibres.
619. J. Cimeg, 162, Great Portland-street—Imp. in silvering glass and other surfaces.
621. O. Saulay, Bordeaux, France—Imp. in stopping or closing bottles, vases, cans, and similar articles, whether of glass, metal, or other material.
622. J. L. Jullion, Tynemouth—An imp. in the apparatus used in the manufacture of paper.

623. J. W. Aston, Cradley, Worcestershire—Imp. in the manufacture of vices.
624. J. Jeffreys, Norwood, Surrey—Imp. in the construction of houses and footways.

Dated 14th March, 1861.

625. A. J. Joyce, Upper Gower-street, Middlesex—Imp. in means for indicating and representing various meteorological or atmospherical phenomena or influences.
627. R. T. Pattison, Daldorch-house, near Catrine, Ayr, and A. M. Pattison, Glasgow—Imp. in the means and method of fixing colours in connection with the printing of woven fabrics and yarns.
629. W. E. Gedge, 11, Wellington-street, Strand—Improved apparatus for saving life at sea or in other waters. (A com.)
631. D. Fryer, Carlton-square, Old Kent-road, Surrey—Imp. in the construction of candlesticks and lamps, in order to render them self-extinguishing.
632. F. Roessler, Bird-street, St. George's-in-the-East—Imp. in apparatus or means for preventing locomotive engines and carriages leaving the rails.
633. W. Clark, 53, Chancery-lane—Imp. in bridges. (A com.)
634. J. H. Wilson, Liverpool—Imp. in pumps.
635. G. Simmons, 40, Frederic-place, Hampstead-road—Imp. in apparatus for making connections with gas and water mains.
637. E. T. Truman, Old Burlington-street—Imp. in masticators or apparatuses for preparing gutta percha, caoutchouc, and other similar substances.
638. E. A. Pontifex, Shoe-lane—Imp. in charging, tunning, or fermenting casks and vessels.
639. J. Hunter, Coltness Iron Works, Cambusnethan, Lanark, N.B.—Imp. in moulding and shaping metals.

Dated 15th March, 1861.

641. B. Samuelson, Banbury—Imp. in machines for breaking up and cultivating land.
642. J. A. Phillips, 12, Earl's-court, Kensington—Certain imp. in the manufacture of white lead, and other salts of lead, direct from ores containing carbonate of lead.
643. J. Bigourat, 2, Gloucester-place, Brixton-road, Surrey—Improving the manufacture of harmoniums.
644. W. Collins, Sandon-street, Salford—Imp. in water, steam, and mercury guages.
645. C. Stevens, 31, Charing-cross—An improved regulator for looms. (A com.)
646. J. Marson, Livery-street, Birmingham—Imp. in breech-loading fire-arms and their projectiles.
647. T. Griffiths, Birmingham—An imp. or imps. in machinery or apparatus for signalling on railway trains.
648. A. Granger, Holborn—Imp. in the manufacture of hats, bonnets, waistcoats, and trimmings for wearing apparel.
650. W. Lorberg, 34, Saint Mary-at-Hill, Eastcheap—An improved process for obtaining and utilizing the chemical products of spent bark (commonly called "tan") and all other woody fibres, also improved apparatus to be employed therefor.
651. C. J. Burnett, 21, Ainslie-place, Edinburgh—Imp. in the structure and construction of ordnance and other fire-arms, and of projectiles to be used with them.
652. F. Trachsel and T. Clayton, Manchester—Imp. in the manufacture of gas, and in the apparatus employed therein.
653. E. Green and J. Green, Broadfield Mill, Lockwood, near Huddersfield—Imp. in carding engines.
654. A. Smith, Brentwood, Essex—Imp. in machinery for cleansing or dressing bass, flax, and other vegetable fibres, applicable also to the thrashing of corn and other grain.
655. W. Schnell, Fitzroy-square, Middlesex—Imp. in the mode of and apparatus for manufacturing lucifer matches.
656. J. Deakin, Birmingham—Imp. in sash frames and sashes, and in balance weights to be used therewith, which said balance weights may be also employed with ordinary sashes or shutters, or for any similar purpose.
657. J. Watkins, Birmingham—Imp. in railway brakes.
659. J. Penn, Newton, Staffordshire—Imp. in whistles or water indicators for steam boilers.
660. S. Perkins, Gorton Works, near Manchester—Imp. in machinery or apparatus for drilling, boring, and cutting metals.
661. W. Cloutman, Calverton, Berkshire—Imp. in tanks or vessels for dairy use.

Dated 16th March, 1861.

662. A. Krupp, Essen, Prussia—Imp. in the construction of mortars, and in the means of attaching the same to the carriages used therewith.
663. J. I. Taylor, Manchester—Imp. in apparatus for the manufacture of gas from coal, oil, or oleaginous substances, and other purposes.
664. J. Holden, Manchester—Imp. in looms, and in apparatus connected therewith.
665. A. Drevelle, Manchester—Imp. in presses for pressing or finishing textile fabrics.
667. F. Jenkin, Stowting, Kent—Imp. in the construction of bridges.
669. A. Prince, 4, Trafalgar-square, Charing cross—An improved electro-galvanic friction brush. (A com.)
670. W. F. Henson, New Cavendish-street, Portland-place—Imp. in railway carriage, buffer, and other springs.
671. E. E. Scott, Windsor-place, Dundee—Imp. in breech-loading fire-arms.

Dated 18th March, 1861.

676. J. Arrowsmith, Bilston, Staffordshire—Imp. in street railways and railways on common roads, and in locomotive engines and carriages for the said railways.
678. C. L. Kottula, Holborn—Imp. in the manufacture of soap.
680. W. E. Newton, 66 Chancery-lane—Imp. in machinery for drawing and spinning wool and other fibrous substances. (A com.)

Dated 19th March, 1861.

686. A. Wall, 20, Canton-street, East India-road, Poplar—An improved mode of preventing corrosion in boiler tubes.
688. J. Smith, Seaforth, near Liverpool, and S. A. Chease, Liverpool—An improved telegraphic apparatus.
620. G. W. Hawksley, Bridge-hill, and M. Wild, Carlisle-street East, Sheffield—Imp. in steam boilers.
692. G. Wilson, York—Imp. in glass stoppers, applicable to feeding bottles, retorts, and other vessels.

Dated 20th March, 1861.

693. T. Brooks, Sunnyside, near Rawtenstall, Lancashire—Imp. in producing combinations of certain colours on cotton fabrics.
695. H. A. Bartlett, Thetford—Imp. in apparatus to protect the flame of a candle from draught.
697. R. A. Brooman, 166, Fleet street—Imp. in preparing caoutchouc adapted especially to dental purposes. (A com.)

[*From Gazette, March* 22*nd*, 1861.]

Invention with Complete Specification Filed.

685. J. J. O. Taylor, 12 Mark-lane—An imp. in the separation of silex and silicious and other matters from steel.—19th March, 1861.

Patents Sealed.

[*From Gazette, March 29th*, 1861.]

March 27th.

2155. B. Oldfield.
2354. J. Aspell, E. Booth, and J. Hurst.
2357. J. A. Callander.
2366. J. Clark, W. Pollock, and J. Whyte.
2370. C. H. Hurst, H. Horsey, and G. Baker.
2373. R. Hellard.
2375. J. Bullough and J. Walmsley.
2376. R. Whittam.
2377. B. H. F. Macnamara.
2384. G. Rhodes and J. Syme.
2385. J. Brokenshire.
2386. J. L. Norton.
2387. G. E. Taylor.
2390. J. Bower and D. F. Bower.
2392. A. W. Williamson and L. Perkins.
2393. J. H. Riddell.
2395. R. J. Cole.
2396. A. I. Mahon.
2404. J. Southeran and J. Carr.
2437. L. J. O. Jolly.
2439. W. Clark.
2445. J. Edge.
2460. J. Ramsbottom.
2478. W. Barker.
2730. G. Wilson.
2882. W. R. Bowditch.
2933. W. M. Storm.
3026. R. A. Brooman.
19. G. Lowry.
36. W. M. Williams.
226. W. E. Newton.
244. A. Boyle.

[*From Gazette, April 2nd*, 1861.]

April 2nd.

2402. J. A. Knight.
2407. J. Morris.
2408. C. Tuckett.
2409. C. Callebaut.
2411. W. MacNaught.
2423. J. Platt.
2424. A. Sarjeant.
2426. W. Yates.
2429. D. Cope.
2430. S. Whitaker.
2433. J. A. Knight.
2438. J. Calkin.
2442. E. Gardner.
2444. W. Snell.
2446. E. Worthington & R. Mills.
2451. R. Anderson.
2453. R. Hands and R. M. Hands.
2454. J. Chandler.
2458. F. Danby.
2465. D. G. FitzGerald.
2469. G. T. Bousfield.
2470. G. F. Stidolph & J. Stidolph.
2471. T. Whitby & W. Dempsey.
2507. C. Stevens.
2533. W. Sear.
2534. R. G. McCrum.
2548. W. Andrews.
2557. A. G. Hunter.
2595. W. Eddington, jun.
2655. A. V. Newton.
2689. W. E. Newton.
2787. W. Brookes.
2850. W. Clark.
2959. W. Pilkington.
3162. C. Lizars.
3174. W. R. Mulley.
163. R. Mushet.
169. G. White.
175. J. Chatterton.
213. R. Mushet.
290. A. E. Chasteau de Balyon.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, March 29th*, 1861.]

March 25th.

678. W. Oldfield & T. O. Dixon.
692. A. Pelez.

March 26th.

654. J. A. V. Burq.
659. J. R. Breckon & R. Dixon.

March 27th.

674. T. Steven, T. Reid, and T. Frew.

[*From Gazette, April 2nd*, 1861.]

March 28th.

684. J. C. Durand.
667. E. A. Jacquin.
731. R. Hornsby, jun.

March 30th.

686. J. Mercer.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, March 29th*, 1861.]

March 26th.

742. W. E. Newton.

Journal of the Society of Arts.

FRIDAY, APRIL 12, 1861.

INTERNATIONAL EXHIBITION OF 1862.—GUARANTEE DEED.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others who take an interest in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £366,600, have already been attached to the Deed.

GUARANTEE FUND FOR THE EXHIBITION OF 1862.

The following additions have been made since the last announcement, in the *Journal* for April 5 :—

*** *The names marked with an asterisk are those of Members of the Society of Arts.*

NAME.	AMOUNT.	REPRESENTING THE OBJECTS OF THE SOCIETY—ARTS, MANUFACTURES, AND COMMERCE.
Robert Cradock Nicholls, 5, Westbourne Park-place, W.	£100	Arts.
*George Augustus Elliott, 13*a*, Belgrave-square, S.W.	100	Arts.
*Conrad Wetter, 67, Myddleton-square, E.C.	100	Commerce.
George S. Sandeman, 15, Hyde-park-gardens, W.	1,000	Commerce.
Joseph Buck, 124, Newgate-street, E.C.	100	Commerce.
Thomas Blackwell, (Crosse and Blackwell,) Soho-square, W.	300	Commerce.
Mrs. H. Brown, Stratton-street, Piccadilly, W.	500	Arts.
Jethro Hornblower, (Hornblower, Fenwick and Co.,) 50, Mark-lane, E.C. ...	500	Commerce.
*William Donald, 69, Regent-street, W.	100	Commerce.
Alfred Webb Miles, 73, Brook-street, W.	300	Commerce.
*Joseph Sharples, Hitchin	200	Commerce.
Robert Ballard Woodd, 108, New Bond-street, W.	500	Commerce.
Charles Davy, 100, Upper Thames-street, E.C.	100	Commerce.
William Watkins, 52, Lime-street, E.C.	100	Commerce.
Edward Roberts, F.S.A., 25, Parliament-street, S.W.	100	Arts.
William James Cockerill, 167, Piccadilly, W.	100	Commerce.
John Savory, 143, New Bond-street, W.	500	Commerce.
*Frederick William Aley, 8, Thurloe-place, S.W.	100	Arts.
Webster and Horsfall, Birmingham	500	Manufactures.
Thomas Cole, 6, Castle-street, Holborn, E.C.	100	Manufactures.
Samuel Fisher, 33, Southampton-street, Strand, W.C.	100	Commerce.
Frederick Sawyer, the London, 191, Fleet-street, E.C.	2,500	Commerce.
Thurston and Co., 14, Catherine-street, Strand, W.C.	500	Manufactures.
Arthur Bernard White, 83, Inverness-terrace, Kensington, W.	100	Arts.
Charles Asprey, 166, New Bond-street, W.	1,000	Commerce.
J. Nisbet and Co., 21, Berners-street, W.	100	Commerce.

By Order,

P. LE NEVE FOSTER, *Secretary.*

INTERNATIONAL EXHIBITION OF 1862.

Her Majesty's Commissioners have appointed the following Committees of Advice :—

Finance.

Rt. Hon. Robert Lowe, M.P.
Sir A. Spearman, National Debt Office.
T. F. Gibson, Esq.
E. A. Bowring, Esq., Board of Trade.
H. Thring, Esq., 16, Duke-street, Westminster, S.W.
Lord Frederick Cavendish, *Honorary Secretary.*

Building.

The Earl Shelburne.
William Baker, Esq., C.E.
William Fairbairn, Esq., LL.D., F.R.S.

Fine Arts.

The Duke of Buccleuch, K.G.
The Marquis of Lansdowne, K.G.
The Marquis of Hertford, K.G.
The Earl Spencer.
The Earl Stanhope.
The Earl of Malmesbury.
The Earl Somers.
The Earl of Dudley.

The Lord Ashburton.
The Lord Overstone.
The Lord Talbot de Malahide.
The Lord Llanover.
The Lord Taunton.
The Lord Elcho, M.P.
The Lord Chief Baron.
Sir Stafford Northcote, Bart., M.P.
Sir Francis Scott, Bart.
Thomas Ashton, Esq.
R. Henry Cheney, Esq.
Rev. E. Coleridge.
E. C. Field, Esq.
R. S. Holford, Esq., M.P.
H. T. Hope, Esq.
John Ruskin, Esq.
William Stirling, Esq., M.P.
S. J. Stern, Esq.
Tom Taylor, Esq.
John Walter, Esq., M.P.
W. Wells, Esq.
The President of the Royal Academy.
The President of the Royal Scottish Academy.
The President of the Royal Hibernian Academy.
The President of the Old Society of Painters in Water Colours.
The President of the Society of British Artists.
The President of the New Society of Painters in Water Colours.
The President of the Institute of British Artists.
The President of the Royal Institute of British Architects.
P. Le Neve Foster, Esq., *Secretary*.

Organization of Committees of Classes.

The Marquis of Hartington, M.P.
The Lord Stanley, M.P.
The Lord Naas, M.P.
The Lord Stanley of Alderley.
The Right Hon. the Lord Mayor of London.
The President of the Board of Trade.
The Vice-President of the Board of Trade.
Thomas Bazley, Esq., M.P.
T. F. Gibson, Esq.
Dr. Lyon Playfair, C.B.
H. Cole, Esq., C.B.
W. Dargan, Esq.
The President of the Royal Agricultural Society.
The Chairman of the Society of Arts.
The Chairman of the Royal Dublin Society.
The President of the Institution of Civil Engineers.
The President of the Institution of Mechanical Engineers.
Presidents of Chambers of Commerce.
Edgar A. Bowring, Esq., *Honorary Secretary*.

Decisions of Her Majesty's Commissioners on Points relating to the Exhibition.

March, 1861.

Her Majesty's Commissioners have fixed upon Thursday, the 1st day of May, 1862, for opening the Exhibition.

The Exhibition building will be erected on a site adjoining the gardens of the Royal Horticultural Society, and in the immediate neighbourhood of the ground occupied in 1851, on the occasion of the first International Exhibition.

The portion of the building to be devoted to the exhibition of Pictures, will be erected in brick, and will occupy the entire front towards Cromwell-road; the portion in which Machinery will be exhibited will extend along Prince Albert's-road, on the west side of the gardens.

All works of industry to be exhibited should have been produced since 1850.

Subject to the necessary limitation of space, all persons, whether designers, inventors, manufacturers, or producers of articles will be allowed to exhibit; but they must state the character in which they do so.

Her Majesty's Commissioners will communicate with Foreign and Colonial exhibitors only through the Commission which the Government of each Foreign Country or Colony may appoint for that purpose; and no article will be admitted from any Foreign Country or Colony without the sanction of such Commission.

No rent will be charged to exhibitors.

Prizes, or rewards for merit, in the form of medals, will be given in the Industrial Department of the Exhibition.

Prices may be affixed to the articles exhibited.

Every article produced or obtained by human industry, whether of

Raw materials,
Machinery
Manufactures, or
Fine Arts,

will be admitted to the Exhibition, with the exception of

1. Living animals and plants.
2. Fresh vegetable and animal substances, liable to spoil by keeping.
3. Detonating or dangerous substances.

Spirits, or alcohols, oils, acids, corrosive salts, and substances of a highly inflammable nature, will not be admitted, unless sent in well secured glass vessels.

The articles exhibited will be divided into the following classes:—

Section 1.

Class 1. Mining, Quarrying, Metallurgy, and Mineral Products.
" 2. Chemical Substances and Products, and Pharmaceutical Processes.
" 3. Substances used for Food, including Wines.
" 4. Animal and Vegetable Substances used in Manufactures.

Section 2.

Class 5. Railway plant, including Locomotive Engines and Carriages.
" 6. Carriages not connected with Rail or Tram Roads.
" 7. Manufacturing Machines and Tools.
" 8. Machinery in general.
" 9. Agricultural and Horticultural Machines and Implements.
" 10. Civil Engineering, Architectural, and Building Contrivances.
" 11. Military Engineering, Armour and Accoutrements, Ordnance, and Small Arms.
" 12. Naval Architecture, Ship's Tackle.
" 13. Philosophical Instruments and Processes depending upon their use.
" 14. Photographic Apparatus and Photography.
" 15. Horological Instruments.
" 16. Musical Instruments.
" 17. Surgical Instruments and Appliances.

Section 3.

" 18. Cotton.
" 19. Flax and Hemp.
" 20. Silk and Velvet.
" 21. Woollen and Worsted, including Mixed Fabrics generally.
" 22. Carpets.
" 23. Woven, Spun, Felted, and Laid Fabrics, when shown as specimens of Printing or Dyeing.
" 24. Tapestry, Lace, and Embroidery.
" 25. Skins, Fur, Feathers, and Hair.
" 26. Leather, including Saddlery and Harness.
" 27. Articles of Clothing.
" 28. Paper, Stationery, Printing, and Book-binding.
" 29. Educational Works and Appliances.
" 30. Furniture and Upholstery, including Paper-hangings and Papier-mâché.
" 31. Iron, and General Hardware.
" 32. Steel and Cutlery.
" 33. Works in Precious Metals, and their imitations, and Jewellery.
" 34. Glass.
" 35. Pottery.
" 36. Manufactures not included in previous classes.

Section 4.

" 37. Architecture.
" 38. Paintings in Oil and Water Colours, and Drawings.

Class 39. Sculpture, Models, Die-sinking, and Intaglios.
,, 40. Etchings and Engravings.

Her Majesty's Commissioners will be prepared to receive all articles which may be sent to them, on or after Wednesday, the 12th of February, and will continue to receive goods until Monday, the 31st of March, 1862, inclusive.

Articles of great size or weight, the placing of which will require considerable labour, must be sent before Saturday, the 1st of March, 1862; and manufacturers wishing to exhibit machinery, or other objects, that will require foundations or special constructions, must make a declaration to that effect on their demands for space.

Any exhibitor whose goods can properly be placed together, will be at liberty to arrange such goods in his own way, provided his arrangement is compatible with the general scheme of the Exhibition, and the convenience of other exhibitors.

Where it is desired to exhibit processes of manufacture, a sufficient number of articles, however dissimilar, will be admitted for the purpose of illustrating the process; but they must not exceed the number actually required.

Exhibitors will be required to deliver their goods at the building, and to unpack and arrange them, at their own charge and risk; and all articles must be delivered with the freight, carriage, porterage, and all charges and dues upon them paid.

Packing cases must be removed at the cost of the exhibitor or his agent, as soon as the goods are examined and deposited in charge of the Commissioners.

Exhibitors will be permitted, subject only to the necessary general regulations, to erect, according to their own taste, all the counters, stands, glass frames, brackets, awnings, hangings, or similar contrivances which they may consider best calculated for the display of their goods.

Exhibitors must be at the charge of insuring their own goods, should they desire this security. Every precaution will be taken to prevent fire, theft, or other losses, and Her Majesty's Commissioners will give all the aid in their power for the legal prosecution of any persons guilty of robbery or wilful injury in the Exhibition, but they will not be responsible for losses or damage of any kind which may be occasioned by fire or theft, or in any other manner.

Exhibitors may employ assistants to keep in order the articles they exhibit, or to explain them to visitors, after obtaining written permission from Her Majesty's Commissioners; but such assistants will be forbidden to invite visitors to purchase the goods of their employers.

Her Majesty's Commissioners will provide shafting, steam (not exceeding 30 lbs. per inch), and water, at high pressure, for machines in motion.

Intending exhibitors, in the United Kingdom, are requested to apply to the Secretary to Her Majesty's Commissioners, at the offices, 454, West Strand, London, W.C., for a *Form of Demand for Space*, stating at the same time in which of the four Sections they wish to exhibit.

Foreign and Colonial exhibitors should apply to the Commission, or other Central Authority appointed by the Foreign or Colonial Government, as soon as notice has been given of its appointment.

Her Majesty's Commissioners having consulted a Committee as to the organization of the Fine Art Department of the Exhibition, will publish the rules relating thereto at a future date.

By Order,
F. R. SANDFORD, Secretary.

Offices of Her Majesty's Commissioners,
454, West Strand, London, W.C.

ARRANGEMENT OF THE EXHIBITION OF 1862.

The following letter has been addressed by the Royal Wurtemburg Central Board of Trade and Manufactures to the Secretary of the Society of Arts:—

Stuttgart, 4th April, 1861.

Sir,—It is with much pleasure that we received, some time ago, the news of an International Exhibition to be held in London in 1862; and we have read ever since with the greatest interest all that has been published in the *Journal of the Society of Arts* and elsewhere.

Now, regarding the mode of arrangement to be adopted in the forthcoming Exhibition, we cannot conceal from you our disappointment in seeing, in the paper read before the Society of Arts on the 13th March, Professor Ansted advocating a system which, as is well known, entirely failed in the Exhibition at Munich. In coercing the industry of all nations into the framework of a scientific system, Professor Ansted entirely overlooks the essential character of an International Exhibition, viz., internationality and the individuality of the exhibitor, placing supreme over all a most unpopular scientific despotism. Everyone who wishes that undertaking to be successful, can only expect this success from the adoption of the arrangement according to countries; and it is this very arrangement which adapts itself, even for scientific purposes, much better than a mere exhibition arranged according to the different kinds of goods. By exhibiting the products of each country as a whole, and arranging the same one after the other in the respective sub-divisions, the exhibition becomes a large index or repertory, in which not only each particular object may be found much more easily than if it had been, without such distinction, thrown in amongst the large bulk of things, but by the aid of which also the different influences which have been in operation at its production and formation will be much more readily discovered than if objects were presenting themselves divested of all their original relations to the industry and the taste of the country in which they had been produced.

The industry of every country, of every province, forms a whole, an image of active life, representing its development in relation to the arts, a spectacle which must offer the utmost interest to the man of science as well as to the manufacturer and the merchant. This image would be entirely lost if we were to arrange the products in any other way than in arraying in the first line the countries, and in the second the classes; and we think the man of science would particularly feel such a loss.

The motive which is usually brought forward by those who are for the rejection of the arrangement according to countries, viz., the assertion that by a separation of heterogeneous articles, the comparison of the kindred products of different countries would be facilitated, does not hold good for a World's Exhibition. For in the first place it is clear that, even in a strict arrangement according to classes, there will be a lot of very heterogeneous things placed one beside the other, except we would even separate from each other the kindred products of each exhibitor (think only of exhibiting the products of Mr. Minton in the midst of chinaware); in the second place, it must be obvious that—allowing also this further separation—already in consequence of the great mass of objects to be exhibited, many of them will be placed at such a distance that a direct comparison will be equally impossible. But a competent judge will surely be able to discern differences in kindred articles, whether they be placed one beside the other or not, whilst on the other hand, to those who do not discover such differences in objects distant from one another, any juxtaposition will afford but little help. Now, exhibitions are, we think, rather for those who know something about industry than mere amateurs, or even for philosophers who would like to use them for their studies.

Leaving these more especially scientific considerations, there will be others of much greater importance, bearing on the economical side of the question. On this head we venture to say that this Exhibition cannot be carried out at all except each individual country takes care of the objects it is going to exhibit; for exhibitors will never

commit their goods into strange hands without receiving a guarantee for their value. The Exhibition Committee, on the other hand, cannot give such security, nor would the respective governments promise any moral guarantee for the goods, unless these should remain under the control of their commissioners. But a commissioner can exercise no control over goods which are dispersed through the whole extent of the Exhibition buildings. Difficult—not to say impossible—as the task of getting the goods in right order might be, we are sure that the returning of them would offer not less inconvenience; indeed, there is the greatest confusion to be anticipated. American goods might go to Russia, German goods to Australia, and so on. It is well known that, to prevent such mistakes, on the occasion of the London Exhibition of 1851, and that of Paris of 1855, commissioners were obliged to enclose each one his own department with a solid fence as soon as they were beginning the packing of the goods.

With what amount of inconvenience the collecting together of the goods is associated under the said circumstances, has been fully shown at Paris, in 1855, where the many annexes did much to increase it; indeed, there was not nearly the same order there as at the London Exhibition of 1851. In the comparatively small Exhibition at Munich, the arrangement according to classes, though not even carried out completely, has given rise to the greatest annoyances; for years the goods were wandering from one wrong place to another, before they came at last into the hands of their true proprietors, and then they arrived mostly in a damaged state, or totally spoiled. A World's Exhibition, strictly carried out after the system of classes, could not fail to discredit Universal Exhibitions for all times coming; and the only measure to be adopted in the direction of an arrangement by classes will consist in this, viz., the separating of machines to be set in motion, as well as of other objects which must be placed separately owing to their bad smell or to their developing noxious gases, and for such like causes. All other objects must necessarily be arranged according to countries, and in the carrying out of this we would only recommend that each country should be bound to take up, as much as possible, the whole breadth of the building, and to adhere to the prescribed order of succession of classes from the right-hand to the left. Then everyone in walking in the direction of the length of the building will be able to trace out the kindred articles, and in walking in the direction of its breadth, to follow after the products of the several countries. Much the same principle was adopted in the arrangement of the Exhibition of 1851, and if this should be carried out more completely, the Exhibition of 1862 will offer all the requisites which, from such a display of industrial products of all nations, can fairly be expected.

As Royal Commissioner for Wurtemberg to the last Exhibitions of London, Paris, and Munich, and in due appreciation of the honour conferred upon me by the Society of Arts electing me for its corresponding honorary member, and of the kindness I received from the part of the Commissioners of the Exhibition of 1851, I considered it right to state to you the views which I and most of my German colleagues entertain about the subject in question. I am, &c.,

STEINBEIL.

CONVERSAZIONI.

The Council have arranged for two Conversazioni during the present Session; the first on Saturday, the 4th of May, at the Society's House, the card for which will admit the Member only: the second on Saturday, the 1st June, at the South Kensington Museum, the card for which will admit the Member and two ladies, or one gentleman.

THIRTEENTH ANNUAL EXHIBITION OF INVENTIONS.

The Exhibition was opened on Monday last, the 1st of April, and will remain open every day until further notice, from 10 a.m. to 4 p.m., and is free to members and their friends. Members by ticket, or by written order, having their signature, may admit any number of persons. Members of Institutions in Union with the Society are admitted on showing their cards of membership.

A sheet of tickets has been issued to every member. Additional tickets may be had on application to the Secretary of the Society.

CENTRAL COMMITTEE OF EDUCATIONAL UNIONS.

This Committee, having been constituted in conformity with the resolutions passed at the preliminary meeting, held at the Society's House on the 8th February (see *Journal*, page 210), held its first meeting on the 22nd ult., the Hon. and Rev. Samuel Best in the chair, when the following resolutions were passed:—

1. That the proceedings of the Provisional Committee be approved, and that the Central Committee of Educational Unions be now established.

2. That the Central Committee being now established those Unions which desire to be admitted by representatives be invited to send in their adhesion as early as possible.

3. That in order to promote uniformity of standard in examination and of value in certificates, all Provincial Educational Unions be requested to send to the Secretary copies of their last examination papers.

4. That when the Central Committee shall have considered the examination papers at present in use in the Local Unions, it shall be their duty to provide a scheme of examinations for common use for the year 1862, and that such scheme shall consist of two sets of papers, one of a lower, the other of a higher, grade, and that both examinations shall be open to persons of both sexes and of all ages.

5. That the Society of Arts having consented to receive the higher certificates as "passes" to their examination (for persons above 16) without the Society's "previous examination," the higher set of papers shall be so framed as to lead to the examinations of the Society of Arts.

6. That the Secretary be instructed to send copies of these resolutions to every Provincial Union, and to request a copy of their examination papers, forms of certificate, and other documents; and that a meeting of the Central Committee be held at 2.30 p.m. on the day preceding the Annual Conference of the Society of Arts.

7. That the following gentlemen, three of whom are to form a quorum, be appointed a sub-committee to make such arrangements as may be necessary to carry out the preceding resolutions, and to prepare for the next meeting:—Hon. and Rev. S. Best, Harry Chester, Esq., the Rev. Samuel Clark, John Slaney Pakington, Esq., and Samuel Redgrave, Esq., with power to add to their number.

8. That the thanks of this meeting be, and are hereby given, to the Hon. and Rev. Samuel Best for his exertions in originating the present movement, and for his able conduct in the chair.

SALE OF CATTLE AND SHEEP IN FRANCE.

The Secretary of the Society of Arts has received a communication from M. Elizée Lefèvre, Director of the *Bergerie Impériale* at Gevrolles, Montigny-sur-Aube, Côte d'Or, announcing that there will be a public sale (by order of the Minister of Agriculture) of cattle of the Mauchamp and Mauchamp-Rambouillet breeds at the Imperial Veterinary College at Alfort, on the 20th instant, and at Gevrolles on the 22nd instant; the latter sale to include sheep of the same breeds. These sheep are of the Merino class, and are from the above-named government establishment.

M. Lefèvre courteously says:—"If any members of the Society of Arts are desirous of attending these sales, I shall be happy to direct their attention to the most remarkable specimens, and shall be glad to make their acquaintance, if they will do me the honour to accept my hospitality." He states that he frequently exports cattle to Australia and the Cape from the establishment over which he presides.

Gevrolles may be reached by railway from Mulhouse, stopping at the Clairvaux station.

SEVENTEENTH ORDINARY MEETING.

WEDNESDAY, APRIL 10, 1861.

The Seventeenth Ordinary Meeting of the One Hundred and Seventh Session was held on Wednesday, the 10th inst., Lord Alfred Churchill, M.P., in the chair.

The following gentlemen were proposed for election as members of the Society:—

Graham, John, M.D. ...	15, Gloucester-road, Regent's-park, N.W.
Harris, Josiah	Ess-hill-house, Newton Abbot, Devon.
Hooton, Jonathan ...	80, Great Ducie-street, Manchester.
Londonderry, Marquis of	37, Grosvenor-square, W.
Lutwidge, Robert Wilfred Skeffington ...	19, Whitehall-place, S.W.
Nugent, E.	Commercial College, Brooklyn, New York, U.S.A.
Salmon, Henry Curwen	36, Lemon-street, Truro.
Sharples, Joseph ...	Hitchin.
Thackrah, James Henry	10, Villiers-street, Halifax.
Wadham, Edward ...	Millwood, Furness Abbey, near Ulverston.
Wield, William ...	Atlas Works, Manchester.
West, J. G.	92 and 93, Fleet-street, E.C.
Whitehead, R. Kay ...	Walshaw-hall, Bury.

The following candidates were balloted for and duly elected members of the Society:—

Blagden, George	5, Duerdin-villas, Tollington-park, N.
Broadwater, Robert ...	3, Billiter-square, City, E.C.
Callow, Thomas.........	8, Park-lane, W.
Coxon, Thos. Cooper...	3 Wharf, City Basin, E.C., and 351, City-road, E.C.
Dodsworth, Thomas ...	Clifton, York.
Gilbertson, W.	Laleston House, Bridgend.
Greaves, Richard	The Cliff, Warwick.
Hertz, James	Manchester.
Jackson, Thomas	Railway Station, Milford Haven.
Jones, Daniel Morgan..	1, Amen-corner, Paternoster-row, E.C.
Kennaway, William ...	The Shrubbery, Exeter.
Kisch, Simon Abraham	8, Lancaster-place, E.C.
Lake, James	Newlands, Sittingbourne.
Langton, W. H. Gore, M.P.	Clifton-court, Clifton, Bristol.
Lawn, William S.	Lancashire and Yorkshire Railway, Manchester.
Le Capelain, J.	Wood-lane, Highgate, N.
Miles, Pliny	169, King's-road, Chelsea, S.W.
Ralph, Jno. Rhodes ...	Savile Lodge, Halifax.
Reiss, James	Manchester.
Rendle, Wm. Edgecumbe	Mount View, near Plymouth.
Tootal, Edward.........	The Weaste, Eccles, near Manchester.
Uzielli, Theodosius ...	Hanover Lodge, Regent's-park, N.W.
Villiers, Rt. Hon. C. Pelham, M.P..........	39, Sloane-street, S.W.
Wright, Francis Beresford	Osmaston Manor, Derby, and 21, Dover-street, W.
Wright, F., Junr.	" " "

The following Institution has been taken into Union since the last announcement:—

Halifax, Harrison-road Young Men's Society.

The Paper read was—

ON TASMANIA, ITS CHARACTER, PRODUCTS, AND RESOURCES.

BY JOSEPH MILLIGAN, F.L.S., F.G.S., &c.

Tasmania, a large and populous island, equally remarkable for the fertility of its soil, the picturesque beauty of its surface, and the salubrity of its climate, lies off the extreme south end of Australia, and is distant from it at the nearest point about 130 British statute miles. It is situated between 40 deg. 40 min. and 43 deg. 38 min. of south latitude, and between 144 deg. 33 min. and 148 deg. 20 min. of east longitude, and contains 14,482,892 acres. Its extreme length, from north to south, is upwards of 170 miles, and from east to west nearly 200 miles.

For the purposes of trade and commerce its position is most favourable; it is easy of access from the Western World, being but a little to the north of the parallel of latitude in which navigators prefer to run down their easting after passing the Cape of Good Hope, and having in its immediate vicinity several rich and populous British settlements. The entrance to Port Dalrymple on the northern side of Tasmania, is only one day's journey of a steam-vessel from Melbourne, the capital of Victoria, two days' journey by steamer from Sydney, and, of course, within a few days' travel of a steamer from New Zealand, Queen's Land, and South Australia. Hobart Town, the metropolis of the colony, being at the south end of the island, upon the broad estuary of the river Derwent is necessarily half a day's travel by steam more distant from the places named, New Zealand excepted. Tasmania was discovered in 1642, on the first day of December, a circumstance which led to the selection of that day upon which to hold the annual regattas established by the excellent Sir John Franklin, when Governor of the colony. The discoverer was Abel Jansen Tasman, who had been dispatched from Batavia, by Anthony Van Diemen, then Governor-General of the Dutch possessions in the East Indies, in command of an expedition for the purpose of exploring the "Great South Land." In compliment to his patron and superior in command, the name Van Diemen's Land was given to the new discovery by Tasman, a name which it retained for nearly two centuries, and which has only been completely and legally replaced by the more euphonious and legitimate one of Tasmania, within a comparatively short period.

In 1772, Captain Marion, from the Mauritius, touched here, when a collision between some of his crew and the aborigines occurred, in which one or more of the latter perished from the use of fire-arms.

In 1773, Captain Furneaux, of the ship *Adventure*, con-

sort to the *Resolution*, and both under the command of Captain Cook, upon his second voyage round the world, having in a fog, off St. Paul's, parted company with his commander, proceeded on his way, made the south end of Tasmania, and anchored in a bay which still bears the name of his vessel, while Captain Cook pushed on to New Zealand. On his third voyage, Captain Cook touched at Adventure Bay, where he left some live stock ashore, which was no doubt destroyed by the natives.

In 1792, Admiral Bruni D'Entrecasteaux, in the *Recherche*, accompanied by Capt. Huon Kermandee, in the *Esperance*, touched here in the course of their voyage in search of La Perouse. The illustrious naturalist La Billardière formed one of this expedition; he was the only officer who returned alive to France, where he published a most interesting narrative of the voyage, in which was contained an account of the fauna and flora of Tasmania, so far as they fell under his observation. The names Recherche Bay, Huon River, Esperance Bay, Kermandee Rivulet, D'Entrecasteaux Channel, Bruni Island, &c., live to commemorate the visit of these Frenchmen.

In the year 1798 Mr. Bass, proceeding in a whale-boat, skirted and examined the south-east coast of Australia, from Sydney to Western Port, and was led to the belief that the sea in which he sailed was a strait. Towards the close of the same year, he, in company with Lieut. Flinders, passed through the strait in a 25-ton sloop, visited some of the islands there, called at the mouth of the Tamar River, Port Dalrymple, and at Circular Head, &c., on the north coast of Tasmania, and finally, after circumnavigating the western and southern coast, and giving names to many islands, headlands, &c., ran into the river Derwent. Bass Strait, thus established to exist between Australia and Tasmania, most appropriately bears the name of the able and adventurous discoverer.

Physical Geography.—The aspect which Tasmania presents to a stranger approaching the shores is that of a hilly and mountainous country, for the most part wooded, bold, and picturesque. The same impression is produced whether it is seen from the north, east, west, or south, but the ranges of mountains along the western coast are by far the loftiest, the most massive and continuous, and the wildest and most striking in outline. Nor is this impression deceptive, for such the character of the island is found to be upon actual examination of, and intimate acquaintance with, its interior.

The largest continuous area of nearly level or but slightly undulating land in Tasmania is on the northern slope of the central valley, upon the eastern side of the elevated plateau of Greenstone, which occupies the middle of the island. This beautiful valley is as sparsely dotted with trees as a gentleman's park in England, and is everywhere clothed with grass. It consists of a continued series of nearly level plains, diversified with rounded elevations of the softest and most fascinating rise and fall; the graceful ease of its undulations appear to be in part due to the crumbling and perishable nature of a porous and vesicular basalt, prevalent over its surface, and in part to the slow character of the recession of the waters which seem to have occupied its site from N. to S. at no very remote geological epoch. Upwards of three-quarters of a million of acres are included within its limits, which extend from the Ben Lomond range of mountains on the east, to Quamby Bluff and the Western tiers on the western side, and from Tunbridge on the south to Perth and Evandale on the north. The upper or southern portion of this valley exhibits various dried-up basins of saliferous lagoons, on the site of which, at certain seasons, a considerable incrustation of common salt may still be obtained. It is well known that in the time of the early settlers, supplies of this useful article were obtained by them from time to time from this source. Changes of surface result from repeated bush fires, devastating and clearing the surface of the country, and from the close and incessant depasturing by sheep, which has the effect not merely of shortening the grass and herbage, but of removing it almost entirely, so as to expose the unshaded surface of the soil to the direct vaporising influence of the sun's rays, where it was originally protected by occasional underwood, and by a thick covering of long grass, greatly modifying radiation and obstructing evaporation. This is a remarkable instance of the ease and rapidity with which considerable physical changes of the surface and aspect of large tracts of country are brought about.

The lower or northern portion of the valley is more or less thickly covered with beds of fine diluvial gravel, derived from the disintegration and detrition of granite, syenite, and trap rocks, of Silurian slates, of carboniferous limestone, and of coal-beds and shales, and of their superincumbent sandstones, everywhere recognisable by the large amount of opalised wood found therein. Fragments of all these formations, and of fossils belonging to the various strata, are found abundantly in this drift, derived from the disruption of the geological beds, still traceable under the western mountains, and developed over a wide extent of country to the eastward of Ben Lomond, and in the various valleys watered by the upper affluents of the South Esk river, which, with its important tributaries, the Macquarie River, the Elizabeth River, the Lake River, and the Meander, finds a devious way through the length and breadth of the valley, till its waters are merged with those of the North Esk in the Tamar River at Launceston.

There are many valleys equally captivating to the eye of taste, and quite as valuable for the purposes of the stockholder and the agriculturist, but none other at the same time so extensive, so productive, and so accessible by good roads and bridges. The plains at Oatlands and on the Upper Jordan afford valuable pasturage; the eastern and western marshes, now converted into flourishing agricultural farms, bear the heaviest of crops, and yield the richest and most succulent natural pasturage; the plains at Brighton and Bagdad, and at Richmond, Pittwater, and Sorell, on the south side, are famous for dairy farms and for abundant corn crops; and the Lawrenny plains, at the junction of the Clyde river with the Derwent, near Hamilton, stand unrivalled for soft beauty of surface and luxuriant pastures: but there is no other tract of country in the island possessing these qualifications which at all approaches the valley of the South Esk in extent and importance.

The district stretching from the Lake river to the Meander, through Norfolk Plains, Westbury, and Deloraine, on the western side of this valley, may be looked upon at present as the granary of the colony. There fields of wheat, oats, barley, turnips, potatoes, hay crops, and other products which characterise English farms, are now found in close series over a large surface of country, where a few years ago there stood heavily-timbered forests.

It has been remarked, and with reason, that the richest soils in Tasmania usually sustain forest trees of the largest dimensions. It has also been observed that where the trees are all, or nearly all, of very large size, they stand further apart, and are, of course, less numerous on a given surface.

In the best pastoral districts the trees are, as I have said, dotted as sparsely and often in groups quite as picturesque as over a nobleman's old domain in England.

In the best agricultural soils the reverse is the case. On the banks of the Huon river, in the south, for instance, on the lands bordering the Rubicon, the Mersey, the Forth, and the Leven rivers, and at Emu Bay and Circular Head on the north, the land is not only clothed with gigantic trees, but there is a densely tangled underwood filling up the intervals. Still, from the very commencement of the colony to the present time, the work of clearing and cropping the land has gone hand in hand with the culture of live stock.

The first notice which I find of wheat grown in Tasmania is in 1807, when the infant settlement had suffered more or less from scarcity of provisions for a period extending into three years. Military sentinels were then placed

upon the wheat fields by government for their protection.

In 1811, there were 1,500 acres in wheat in the colony. In 1821, the land in cultivation amounted to 14,940 acres. In 1841, the cultivated land amounted to 132,614 acres. In 1851, 151,846 acres. In 1859, last return available, it is stated at 208,619 acres, and that the area of land brought into cultivation during the year amounted to 7203½ acres.

Occupying the larger portion of the very centre of the island of Tasmania, is a huge plateau of greenstone, having an elevation above the sea of 3,000 to 4,000 feet, and comprising within its limits a series of lakes and lakelets, which vary from the size of a mere pond to that of the Great Lake, which is possessed of an area of 80 square miles, and a depth from a few feet to many fathoms, as is the case of Lake St. Clair, from which the noble Derwent takes its rise. Situated upon and within a large field of eruptive rock, these lakes have by some been regarded, rather hastily perhaps, as the sites of the craters of extinct volcanoes.

The great elevation of this extensive table land, and the proximity of the high mountains on its western margin to the west coast of the island, secure for the district a greater abundance of rain in the course of the year than falls to the share of the lower districts on the eastern and south-eastern sides; and coupled with this humidity there is a cooler average temperature: from which conditions there accrues a most ample supply of verdant pasturage at seasons when, on account of continued sunshine and drought, it is very scarce upon the low-lying sheep-runs to the eastward. Hence has arisen the practice amongst flock-owners, of holding stations both on the lower and higher lands, the former for winter, and the latter for summer pasturage, a custom which has added vastly to the capabilities of the colony for depasturing sheep. The experience of some years has, notwithstanding that snow storms and frosts are not unfrequent during the winter in these high regions, taught those in charge of sheep there, that their flocks may upon most parts of even this elevated table land be depastured during the winter season of ordinary years, and accordingly this practice has of late obtained; and summer runs have been sought upon the coarse marshy plains still further to the westward and southward.

Thousands on thousands of sheep are depastured over this high table-land, but its remoteness and the rough condition of the roads, preclude the exercise of any other branch of rural industry there. It furnishes to the low country on its eastern side a number of sparkling rills and rivulets, but no considerable river; on the southern side there issues from Lake St. Clair the already ample stream of the Derwent, whose waters acquire additional volume by the influx of the Dee from Lake Echo, the Shannon from the great Lake, and the Clyde from Lake Sorell; while on the northern aspect it gives rise to the Mersey, and the Forth, both large rivers.

The face of the country to the north-west, west, and south-west of the table land is generally densely clothed with large umbrageous timber trees and thick underwood, growing upon soil of almost every conceivable variety of composition and quality There extends along a great part of the western side of the island, at inconsiderable and irregular distances from the coast, a chain of high hills, formed of an old red conglomerate, dipping westerly. These conglomerate ranges attain an altitude of 3,000 to more than 4,000 feet, and, standing as they do in the path of the water-laden clouds drifted over from the Indian ocean by the prevailing westerly winds, attract and receive their discharged contents in the shape of frequent and continued heavy rains, leaving a smaller supply for the table land in the centre, and still less for the low eastern pastoral and agricultural lands to which a certain contingent is all important.

In the dense dark forests to the westward, the humidity is at all times great. There is little or no evaporation in such forests, as the rays of the sun never penetrate to the ground, and the umbrageous foliage overhead forms a canopy which is well-calculated to prevent evaporation, as it certainly does the radiation of heat. The temperature in the deep recesses of these dense and dark forests, varies but little usually from that of the mean annual heat of the place, for not only are the rays of the sun excluded for the most part, but the winds find no admittance, and except at some open glade, an explorer finds it difficult to decide whether there exists any breeze, and can only judge by watching the motions of the topmost sprays upon the tallest trees.

From Cape Grim, the extreme north-west point, to Port Davey and the extreme south-west cape, the country is traversed in every direction with rivers, rivulets, and rills of water. The lowlands along the eastern side of the island are, on the other hand, at certain seasons somewhat deficient of this essential element of fertility, and as it has been proved that land laid down with artificial grasses and properly irrigated will maintain eight large sheep to the acre the year round, and yield agricultural crops in proportion when so treated, a desire has arisen on the part of the colonists to see a comprehensive and systematic scheme of irrigation carried out by government, taking as a basis the utilisation of the vast stores of water contained in the lakes with which the table-land is studded. Of the practicability of this scheme, I do not profess myself competent to form an opinion of any practical value, but this may safely be affirmed, that if it could be accomplished it would make the lands so operated upon ten times more productive and valuable than they are at present, both as respects their agricultural and sheep-feeding capabilities. The average annual fall of rain at Hobart Town, and over the comparatively low lands on the eastern side of Tasmania, is about 21 inches, while the yearly rain-fall throughout the dense forests along the north-western and western side of the island varies to upwards of 50 inches in the twelve months.

It is obvious that a country the surface of which undulates much, will require more rain than a country the face of which is level, and that hilly land requires more frequent rains than flat ground, on account of the tendency to run off rapidly, and to pass away in particular channels in the case of a much inclined surface. It is also obvious that more frequent rains must be requisite to preserve a country in a state of fertility which enjoys a large share of sunshine the year round, as compared with that necessary to a country where a large proportion of the days in the year are cloudy. It would follow that Tasmania ought to have more rain than England, and that the western side of Tasmania ought, *cæteris paribus*, to yield heavier crops, and generally to be more productive than the eastern districts of the island,—a conclusion which remains to be proved, as the western country continues yet unoccupied, if exception be made of the Van Dieman's Land Company's settlements, at Circular Head and Emu Bay, where, however, crops are obtained sufficiently heavy fully to justify the expectation that the western and yet unoccupied districts of Tasmania must ultimately become the most productive and valuable—in fine, the granary of the island.

It must, however, be confessed that much of the land on the western side is too hilly and too highly inclined to be applied to agriculture, and that there are also there extensive tracts, the soil of which must for a long period preclude their application to farming purposes. At the same time it is to be remembered that the climate along the western side of the island is of the most favourable character for ensuring to farming operations the very highest results. At Hobart Town, and along the low eastern districts, the mean annual temperature is 53 deg., and the atmosphere at all seasons rather arid, the yearly rainfall being 21 inches; whereas, on the western side, at low levels, the temperature is quite as warm, and as the rain-fall is double, or more, the aridity peculiar to the eastern side, and to Australia gene-

rally, is unfelt, and there is in place of it a balmy softness, most conducive both to animal and vegetable life.

The prevailing form of surface rock throughout the island is some form of trap greenstone or basalt. On decomposing it forms a rich chocolate-coloured mould, or heavy hazel loam, admirably adapted for wheat crops. It forms the superficial rock upon which many of the finest sheep-runs in the colony are situated. Greenstone forms the boldest headlands around the seaboard of Tasmania, as Circular Head and Table Cape, in Bass Strait, and the South-East Cape, Fluted Cape, and Cape Pillar, at the south end of the island. It constitutes, also, the culminating point of many of the highest mountains in the island: for instance, Mount Wellington, 4,240 feet, Ben Lomond, 5,000 feet; Dry's Bluff, 3,500 feet; Black Bluff, 4,000 feet; St. Paul's Dome, 2,500 feet, &c.

Granite shows out round the southern flank of Ben Lomond and St. Paul's Dome, and along the east coast from Schouten Island to Cape Portland; it also crops out near the Eldon range, and to a large extent at the Hampshire hills in the west and N.W. It rarely attains an altitude of more than 2,000 feet. The soil formed over it is usually a cold ungenerous clay, supporting a very thin covering of pasture grass. Slate rocks, belonging to the auriferous series, present their vertical edges over an extensive district, stretching from Fingal and Falmouth with but little interruption to the N.E. point of the island, and in an easterly and westerly direction from Eddystone Point to the River Tamar at Mount Direction. Slates of probably the same age, occur on the Meander river, on the Inglis river, and on the Hellyer river, and at the Sisters and Cape Grim, &c., on the north coast. This slate forms on decomposition, a barren white soil of clay and sand. In the district of Macquarie Harbour and Port Davey, there is an extensive tract of country over which a highly silicious slate prevails, yielding by decomposition a soil of peat and sand, which, without drainage and lime, is almost worthless.

Coal, sandstones, and their associated schists prevail in many localities, but being usually capped with greenstone, we see little of the cold gray spewy soil characteristic of them in the coal districts of Great Britain. The carboniferous limestone and associated beds of clay, crop out at various points along sundry meridional lines, and contribute to form a tolerable soil. An older fossiliferous limestone is disclosed in great force along the Gordon and Franklin rivers at Macquarie Harbour, and is also met with in the King river. In these positions accessible to boats and small craft, limestone will prove of the utmost value when the district comes to be occupied by settlers.

On the eastern margin of the Bay at Macquarrie Harbour are tertiary cliffs of incoherent sandstone, containing beds of jetty lignite and nodules of fossil resin, &c.

The chief of the mountain chains as well as the ranges of hills of secondary importance in Tasmania have a line of direction nearly meridional. The principal valleys and the rivers which flow through them follow the same law. The estuaries of the largest rivers open on the north and south coasts, and afford the safest and most convenient harbours for shipping. Hobart Town Harbour, situated within the estuary of the Derwent river, and at the very foot of Mount Wellington, is there three miles in width, of great depth, and perfectly land-locked; it is easy of access, and one of the most safe, capacious, and convenient of anchorages in the world. The Derwent river runs nearly north and south, and its estuary opens on the south coast. The Huon river has a course nearly north and south, and opens into D'Entrecasteaux Channel on the south, where it affords good anchorage, and is now a port of entry, &c., and a place of considerable business, being one of the principal seats of the timber trade in Tasmania.

Port Esperance and South Port are also at the south end of the island, as is Port Davey at the south-west extreme of the colony. At the northern end of the island is Bass' Strait, the Tamar, the Rubicon, the Mersey, the Inglis, &c., &c., all rivers navigable to distances varying from 40 miles to one or two, flowing from south to north. On the east coast of Tasmania there are no rivers of any considerable size or importance, although there are safe anchorages at Spring Bay, and the Bay of Fires. On the west coast the Gordon, the Franklin, and the King rivers discharge their waters into the capacious estuary there, the direction of the Gordon and Franklin being north-west and south-east through a great part of their course. The Arthur runs also in a direction nearly north-west and south-east and is a considerable river, but not navigable. The Pieman river also opens on the west coast, and has a considerable estuary, but cannot be entered on account of a bar at its mouth.

The principal harbours of Tasmania are therefore situated at the north and south sides of the island, those at the south side being the deepest, most capacious, and most accessible. The climate of Tasmania has been compared to that of the South-west of England, with this important difference in its favour, that it is milder during the winter, and that the atmosphere is generally clearer and drier—conditions highly conducive to health, and very congenial to the feelings of natives of the British Islands.

The mean annual temperature, as deduced from 14 years' observations, taken at H.M. Observatory, at Hobart Town, is 53°. The highest temperature registered during this period is 105°—the mean daily range of the thermometer on the 14 years, is 60° 65, and the yearly fall of rain, as already stated, is about 21 inches. Thunder storms are neither so frequent nor so severe as in the British Isles. Snow rarely falls, except on the high table-land, and upon the mountain ranges. Continued frosts are unknown in Tasmania; the frost of the evening and night, when it does occur, invariably yielding to the balmy influence of a bright warm sun upon the following day. The hot, close, sultry, and oppressive weather, understood by the significant term "Muggy," so frequently occurring toward the close of an English summer, is rarely experienced even for a day in Tasmania, and a sultry night is almost unknown there. It may be broadly stated that, however hot the weather may be during the day in Tasmania, the evening and night which succeed are cool and invigorating, so that relaxation from a continuance of warm weather never occurs. The fine open weather which characterises the winter of Tasmania offers to the agriculturist those facilities for prosecuting the labours of his farm which he would in vain expect to find in any other part of the world.

The process of haymaking, which in the British islands is so hazardous, from the showery nature of the weather at that season, is in Tasmania accompanied with no risk or anxiety whatever, unless it be to see that the exsiccation is not carried too far under the united influence of a clear sky, a bright sun, and a dry atmosphere. Wheat harvest is conducted under the same benign influences, and with the same total absence of all feeling of uneasiness on the score of weather.

The conditions of Tasmanian climate are therefore not only admirably suited to the constitution and habits of an Englishman, but they are better adapted for the furtherance of his views and objects as an emigrant and farmer than those of any other possession or territory under the British crown. Looking to the superior advantages which Tasmania offers to the British settler, there is one of no small moment to his peace, comfort, and prosperity, namely, the total absence of danger and insecurity from the presence of aboriginal inhabitants.

Aborigines.

It will scarcely be expected that much should be said in this paper about a race now nearly (and to all practical intent actually) extinct. They probably belonged to the Oceanic negro or Papuan race, but how or when separated so far from their kindred is a problem which remains to be solved. The notices of them recorded by the early

navigators are few and meagre. It is known that at the time of the occupation of the island by British subjects, in 1803, there were a certain number of tribes belonging respectively to well-defined districts in the island, and the numerical strength of each tribe may be inferred with tolerable exactitude, from the accounts handed down by early settlers of the force which they have seen mustered in particular districts on great occasions. These data, modified by considerations as to the means of sustenance originally afforded by particular districts, lead to the conclusion that the whole aboriginal population of the island never much exceeded 2,000 in number. In their wild state they wore no clothing of any kind, and had no permanent abode; a few sheets of bark laid against the limb of a fallen tree was their substitute for a house. The men besmeared their heads and bodies with the fat of the wombat and red ochre, and their frizzled hair, which was never cut, hung in matted corkscrews round the head like a reddened mop. The women wore no hair, but kept their heads close shaved, a process which they performed by means of sharp-edged flints. Both sexes cut and raised scars upon their limbs and bodies in compliance with established custom, and in accordance with certain symmetrical patterns fashionable amongst them. The tribes were always at war with one or other of their neighbours, from whom the men obtained their wives by force when negotiation and furtive attempts failed, having a strong prejudice against intermarrying in their own tribe or family circle as it were. They were monogamists, but not remarkable for continence. Anthropophagism was never practised by the aborigines of Tasmania. They lived entirely by the chase; for the roots, fungi, core of fern-tree, tubers of orchids, sea-weed, and fruits, &c., which they did eat from time to time, formed together but a slender item in their ordinary bill of fare. They invariably cooked their game, whether large or small, in the skin; a practice which preserved to the meat its full flavour and all its natural juices. The only arts which they knew or practised, were those of the preparation by the men of spears and waddies for the purposes of war and for hunting, and the construction of bark canoes with high stem and stern (as represented in La Billardière's work), in which to pass to the islands adjacent to the main land of Tasmania; but the women made baskets in which to carry their flints, cray-fish, and other small game, and manufactured glittering necklaces of shells wherewith to adorn themselves and their lords. The first serious collision between the aborigines and the settlers, is recorded as having taken place on the 3rd May, 1804, when 50 of them are said to have fallen. From that time to 1835, when the remnant were taken under the immediate care of government to an establishment prepared for them; the deaths from hostilities between the tribes, from fire-arms in the hands of convicts, and the ruder sort of settlers, and from disease, &c., must have been enormous, as only 210 were found for adoption by government at that date. It is upwards of 25 years since the government removed the then residue of the aboriginal population to an establishment provided for their maintenance and comfort; a remnant of 10 or 12 only remained alive at the close of 1859. It is satisfactory to know that it has been the pride as well as pleasure of each successive ruler of Tasmania to protect its aboriginal inhabitants, and, as far as practicable, to meliorate their condition and minister to their comfort.

History.

Tasmania was first occupied as a British settlement in August 1803, by a party of soldiers and prisoners under Lieut. Bowen, dispatched from Sydney for the purpose. Rest-down, or Risdon, on the east bank of the River Derwent, a few miles above Hobart Town, was selected as a site.

In February, 1804, Col. Collins arrived with an accession of marines and prisoners from Port Philip, which, after a short trial, was pronounced unsuitable for settlement and accordingly abandoned. It is not a little remarkable, that in an order of the day, dated 31st December 1803, Col. Collins should have made use of these words: "In this the whole are concerned, since the sooner we are enabled to leave this unpromising and unproductive country, the sooner shall we be able to reap the advantages and enjoy the comforts of a more fertile spot." Col. Collins removed the head-quarters of the settlement to Sullivan's Cove, the present site of Hobart Town. In 1805-6-7, a great scarcity of provisions existed, and the price of wheat was fixed so as not to exceed £4 per bushel (£32 per quarter). Sentinels were placed over the wheat fields. In 1810 the settlers on Norfolk Island were removed to Van Diemen's Land, where they obtained grants of land. Col. Collins died on the 24th March, 1810. The administration of the government, continued in succession in the hands of three officers in command of troops in the colony.

In 1813, Colonel Davy arrived as Lieutenant-Governor. In 1814 wheat was 10s. per bushel. In 1816 the population was 1,461. In September of that year, the first emigrant ship reached the colony; and in that year a Post-office was established. In 1814, General Macquarie, Governor-in-Chief, with his lady, paid a visit to Van Diemen's Land, and there is a tradition afloat, that Mrs. Macquarie crossed the then wild country from Hobart Town to Launceston, in the only available vehicle, a bullock cart, and that she was greatly scandalized at the unhandsome terms in which her coach driver addressed his cattle.

In 1817 Col. Sorell arrived and assumed the Government. Wheat was exported to Sydney this year to the amount of 20,000 bushels. In 1824 Col. (afterwards Sir George) Arthur arrived as Lieutenant-Governor. In November 1825, General Darling, then Governor-in-Chief, brought to Hobart Town a proclamation declaring Van Dieman's Land independent of the government of New South Wales. In 1826, bushranging, which had assumed the formidable dimensions and character of regular mounted banditti, was effectually and permanently put down.

Colonel Arthur, after 12 years of anxious and energetic exercise of the functions of governor, left the colony on October 30th 1835. He was succeeded by Sir John Franklin, who arrived on 6th January 1836—Colonel Snodgrass having administered the government in the interim. The personal good qualities and simple manners of Sir John procured for him general respect, and the generous munificence of himself and Lady Franklin are still held in warm remembrance in the colony. At considerable cost Lady Franklin raised, and endowed with a gift of land to be converted into an arboretum, a building with Grecian pente-style front for the purposes of a public museum in the suburbs of Hobart Town; and it is known that in the course of one summer she disbursed the sum of £600 as payment for the destruction of venomous snakes which had previously shown themselves in great numbers in the settled districts.

Sir John Franklin first admitted the presence of the reporters for the daily press during the proceedings of the Legislative Council.

In 1834, the Messrs. Henty, of Launceston, had initiated the colonisation of Port Philip, since styled Victoria, by sending to Portland Bay and Port Fairy, a large number of breeding ewes. The shores of Hobson's Bay and the banks of the Yarra Yarra were occupied the following year by flocks introduced by Messrs. Bateman, and Co., Mr. Falkiner, and others, from Hobart Town and Launceston. During 1836-7-8, the exodus of settlers and live stock flowed from Tasmania in a continuous stream to Australia Felix; and at the present time some of the most extensive and valuable sheep-stations there are held by Tasmanian settlers. To the enterprise, intelligence, and active industry of the occupants of Tasmania, is therefore due the development of the vast resources of the far-famed gold colony of Victoria.

In August, 1843, Sir John Franklin was relieved of his government by the arrival of Sir J. E. Eardley Wilmot, whose administration of the affairs of the colony lasted

till 24th September, 1846, when a despatch from the Secretary of State informed him that he had been superseded. Mr. La Trobe, then Superintendent, and afterwards Governor of Victoria, held the reins of government in Tasmania till the arrival of Lieut.-Governor Sir Wm. Denison, on the 26th January, 1847. The able, vigorous, and impartial conduct of the public affairs of the colony by Sir William, during a period of time agitated by the vital question of the continuance of transportation of convicts to the island by the British Government, procured for him many warm supporters and some bitter opponents.

Constitution.

The Australian Colonies Act of August, 1850, which was brought into operation in Tasmania, conferred on the colony the first instalment of representative government. The Council so appointed consisted of twenty-four members, sixteen elected, and eight nominated by the Crown. This transition Council digested and arranged the terms of the Constitution Act, which, having been submitted to the Imperial Parliament, and obtained its sanction, is now the law under which the government of the colony is conducted; it came into effect in the island in 1856. It provided for legislation by two Houses of Parliament and a Governor, who has power to give or withhold, at his pleasure, the royal assent to acts passed by them. The Upper House is constituted of 15 members (who must be of the full age of thirty years), elected by persons possessed of a freehold of the value of £50 a-year rental, and by persons who have passed degrees in medicine, &c., from British Universities; five members to retire annually. The Lower House consists of thirty members, elected for five years, by persons having a suffrage of a £10 yearly rental, or a freehold of £100 value. The elections are all conducted by ballot. It was reserved for Sir Henry Young, the successor of Sir W. Denison, to initiate this representative and responsible system of government, and it is satisfactory to be enabled to say of it, that hitherto it has been found to work harmoniously, and, upon the whole, beneficially for the country.

Convict Question.

The great question of the abolition or continuance of transportation, which so long agitated the Australian colonies, and which was perhaps finally disposed of, so far as Van Dieman's Land was concerned, by the fortuitous circumstances of the discovery of gold in unprecedentedly large quantities in the neighbouring colony of Victoria, has never, it appears to me, been fairly considered upon its merits. The inhabitants of the Australian colonies regarded the subject from their own point of view; they were a party concerned, and could not be expected to express themselves in favour of transportation as a secondary punishment in the abstract, while they themselves were waging war to the knife in order to be freed from its practical operation. Arguing the question of transportation as a secondary punishment, as tried by its results, I am inclined to pronounce it a great success. The British government has conducted an experiment of stupendous magnitude, spread over a long period of time, at an expense which would have deterred any other nation from prosecuting it even if commenced.

In round numbers 100,000 criminals have, during a period of about 70 years, been conveyed to the various Australian settlements. Assuming that one-half per cent. of the whole number, an assumption probably much beyond the truth, have been taken off by capital punishment, and that an equal number of irreclaimable ruffians remain under restraint, then 99 per cent. of the whole must have merged in the mass of the Australian population, and whether morally reformed or not, they have at least become safe members of society, and peaceful, orderly, and industrious citizens. The result is too great and startling to have been anticipated, but having been realised, it is but just to give it its due weight in the consideration of a question of such gravity. It is not intended to assert that all the details in the course of this unparalleled experiment have been perfect in conception and carried out with scrupulous precision; the grand result has alone to be looked at, and no one regarding it with an unprejudiced eye can by possibility arrive at any other conclusion than this, that a vast, costly and momentous experiment in the interests of humanity and civilisation has terminated in a result more successful and satisfactory than the most ardent philanthropist would have dared to hope for. Experience of the working of the convict system formerly in operation in the Australias enables me to comprise in a few brief observations the treatment most productive of good in respect of the criminals; and as the improvement of such a class in any community must be identified with the welfare of the community itself, the effect upon the interests of the colony in this case does not require to be separately considered. There is a condition of things which may be artificially produced in a new country analogous to that which superabundant population causes in old communities. This condition is reached by glutting the market with forced labour, so that its value falls to a point at which the criminal is tempted to think it more his interest to make money by vicious practices than by the exercise of honest industry, a state of things of chronic continuance in old densely-peopled countries. Like conditions will produce like results. If a convict is thrown back into the community from which he came—forced within the sphere and influence of old associates in crime—his wants the same as before, and his ability to satisfy them diminished, he inevitably becomes again a criminal. Remove him from old associates, and relieve him from the pressing wants which made him infringe the laws, and his tendency to misconduct is reduced to a minimum. Transport the offender to a new country, where labour is in demand and well remunerated, where there are numerous avenues open through which any one may, by honest industry, prudence, and perseverance, rise to competence, if not wealth, and to consideration, measured rather by the standard of present than of bygone conduct, and at once a new spirit is infused into the man, and a new vista of life presented to appetites sharpened by disappointment and the hard, heavy hand of stern necessity. Placed thus he is in the position which the majority of the 100,000 already quoted have severally occupied; and, as like causes produce like effects, he may, like them, become an orderly, industrious, and respectable citizen. There is at the same time a limit beyond which it would not be either desirable or safe, even in a new country, and under the best devised regulations, greatly to increase the proportion of convicts; a limit which, as already indicated, is reached whenever the wages of labour fall so low that the quondam criminal may once again be tempted to think it easier for him to make a livelihood by nefarious means than by honest industry, a limit which, probably, had been attained in Van Diemen's Land some time before the gold diggings of Victoria were developed, when the discontinuance of transportation, from being a question of state policy became in the nature of things a necessity.

The high premium offered for labour at Victoria during the first days of the gold diggings produced a convulsion in the labour market of Tasmania, from which it has scarcely yet recovered. The dazzling prizes which from time to time fell to the share of lucky adventurers, stimulated the working population to a general exodus, and thousands upon thousands left the island to try their fortune in Victoria. Happily for Tasmania, the worst characters amongst the labouring classes were the very first to move off, and but few of this description have returned. Many hard-working, honest men did return with heavy gains, which not a few were wise enough to invest in the purchase of land, or live stock, on leased farms. Agricultural operations were for a time all but suspended, and farmers generally suffered great inconvenience and loss, for which, however, they were amply compensated by the fabulously high prices which they afterwards obtained for their produce. The high price of land, high rents,

high prices of live stock, agricultural produce, and of other commodities, have greatly fallen since the palmy days of the gold diggings, but the wages of labour have scarcely fallen in proportion. The explanation is probably this—the accumulation of capital by the working classes has been, and still is, so rapid, that they are converted, with expedition scarcely conceivable, from the condition of servants and labourers into that of employers, thus creating a new demand for labour, and contributing by their change of position to sustain rates of wages which it has become their interest to see depressed. The following are the rates of wages prevailing throughout Tasmania in 1860:—

Wages.

	Per Day.
For common labourers, without maintenance,	4s. 0d. to 6s.
,, bricklayers ,, ,,	8s. 0d. ,, 12s.
,, carpenters and joiners ,, ,,	8s. 0d. ,, 11s.
,, masons builders ,, ,,	7s. 9d. ,, 12s.
,, ,, stone-cutters ,, ,,	7s. 6d. ,, 12s.
,, plasterers ,, ,,	7s. 0d. ,, 12s.
,, plumbers ,, ,, ,,	7s. 6d. ,, 14s.
,, quarryman ,, ,, ,,	6s. 0d. ,, 9s.
Yearly domestic servants obtained, with lodging and maintenance	£30 to £40.
,, farm servants ,, ,,	ditto.
,, shepherds ,, ,,	£30 to £45.
,, grooms ,, ,,	£30 to £40.
,, female servants of all-work ,,	£20 to £25.
,, laundry-maids ,, ,,	ditto.
,, cooks ,, ,,	£25 to £40.

During the time when the highest prices prevailed in the colony, domestic servants, man and wife together, obtained £60 to £80 a-year, with board and lodging. The sawyers and wood-cutters in the Huon district were, at the same time, earning from £10 to 12 per week. Men with fixed moderate incomes felt severely the pressure, and even the Government felt constrained to add nearly 50 per cent. to the salaries of its *employés*, an increase which has since been withdrawn. The rents of houses in Hobart Town, which, in 1851, previous to the gold diggings, had let for £75 and £100, rose soon after to £150 and £250, but have since receded with the times, and now let respectively at about £90 and £120; still exhibiting an advance upon the rates of 1851.

The first effect of the gold diggings being the withdrawal of the greater number of the working men from their ordinary avocations, a temporary paralysis was produced in every branch of industry and enterprise. Farming operations were narrowed and impeded; contractors for public works were unable to meet their engagements, and all such undertakings were suspended; incipient manufacturing establishments were entirely given up, and long established branches of trade, such as the whale fisheries, were practically abandoned for the time. There was a pause, a cessation of the bustle and activity characterising new communities, but there was no collapse; industry and capital ~~in its train~~ had suddenly found new and profitable channels for their investment, and every one was eager, excited, and expectant. The influx into Victoria of a teeming population of thousands per day, with every want to be supplied, created a demand for houses, provisions, and goods of every description, which speedily cleared off, at enormously high prices, the old stocks of goods on the hands of Tasmanian merchants, and gold was bought in return at a rate which left a large profit to the speculator. Money, too, that is the circulating medium, became scarce, and again Tasmania stepped in, and her bank-note, transferred to banks in Victoria, and stamped by them as payable at their counting houses, were improvised as a local currency. But the spirit of speculation engendered by the gambling nature of gold digging operations at length spread from Victoria to Tasmania, and precipitate and hazardous speculations taking the place of sound enterprise, much of the capital which had been realized so unexpectedly, and in so brief a time, was again clutched from the hands into which it had fallen. A reaction ensued, the effect of which is, at this time, severely felt in all the Australian colonies.

The industry and capital of Tasmania have, almost from the very outset of the colony, been directed in the main to the production of three great staple articles of trade—wool, oil, and wheat. With the culture of these some collateral products, such as live stock and various sorts of agricultural produce, and some new objects of industry, have grown into importance; for instance, the preparation of timber and the growth of fruit for the markets of the neighbouring colonies.

Population and Trade.

As the prosperity, wealth, and importance of a new country may be said to depend entirely upon population operating on its natural resources and capabilities, I shall briefly state its progress in Tasmania.

In the year	1810	the number of inhabitants was	1,321
,,	1820	,, ,, ,,	5,400
,,	1830	,, ,, ,,	No return.
,,	1840	,, ,, ,,	46,057
,,	1851	,, ,, ,,	69,187
On 31 Dec.	1859	,, ,, ,,	86,451

And allowing the recent rate of increment down to the present year (1861) the number would be now nearly 90,000.

So general was the exodus of the working population during the gold diggings period of excitement, that the emigration from Tasmania in 1851-2 and 3 amounted together to 35,077: and it is shown by statistical returns that upon these three years there is a balance against the colony of emigration over immigration of more than 10,000 adult individuals, who were poorly replaced by the arrival of families amongst whom were 6,000 women and children. The abstraction of so large a proportion from the adult labouring classes in the colony inflicted a considerable check, and told for some time very distinctly on the results of its productive industry. For instance, the breadth of land in wheat crop in 1851 was 66,236 acres, whereas in 1853 it amounted only to 44,123, and in 1854 to 42,920 acres; a state of depression from which it had so far recovered in 1859 as to have attained in that year to 60,314 acres.

Wool, which in the early times of the colony was permitted, it is said, to rot in heaps on the premises of the settlers, and which from its coarse and low character at the time scarcely deserved a better fate, has been so highly improved in later times, and increased in quantity so immensely, as to have long occupied the place of the principal export and mainstay of the colony. This important end has been attained through repeated and long-continued crosses with the sheep (both ewes and rams), selected from the finest merinos and Saxon flocks in Europe by enterprising colonists, and by the agents of the Van Dieman's Land Company, the purity and excellence of whose live stock of every description long maintained a high character, and fetched the best prices. The capabilities and suitability of Tasmania for the production of wool of the finest fibre and highest value for the purposes of the manufacturer is well known. The high prices commanded in the English market by wool from the flocks of Messrs. Kermode, Smith, Maclanachan, &c., practically attest the fact. Its character was acknowledged to be of the first order at the London Exhibition of 1851, and at Paris in 1855. The capacity of the island for maintaining a much larger number of sheep than are at present depastured there, can scarcely be doubted. For a long time sheep-owners in Tasmania cultivated fineness and softness of fibre exclusively, and the result was a delicate animal and comparatively light carcase, but a change took place with the rise in the value of animal food, and for many years past it has been the aim of flock-owners to combine length of staple with fineness of fibre to the utmost extent which they can command, a course by which they obtain a much heavier fleece, and a larger and probably hardier animal. With

this view the highly improved merinos have been crossed with the Leicester, New Leicester, and South Down breeds, &c., and in many instances with great success. From the statistical tables published by government are extracted the following return of sheep depastured in the colony, and of the value of wool exported therefrom in the years mentioned. In 1823 wool was exported to the extent of about 1,000 bales. In the year

		No. of sheep.		Value of wool.
1839	—	898,590	—	£194,647
1844	—	1,145,089	—	176,269
1849	—	1,712,291	—	202,334
1854	—	1,831,308	—	325,384
1859	—	1,697,199	—	467,968

There appears to have been a falling off in the number of sheep in the colony since 1854, but on closely examining the returns I find the weight of wool exported in 1854 stated to have been 4,419,276 lbs., while in 1859 it was 6,107,903, and as there is a nearly corresponding difference in the value, it may be concluded that small sheep, of short wool and light fleece, had been replaced to some extent with sheep of larger frame and longer and heavier wool. Upon artificial pastures, along the north and north-west coast, where the climate is humid as well as warm, the Leicesters attain a size and weight little short of the prize animals exhibited at cattle shows in England, but they are not calculated to thrive on the comparatively thin natural pasturage. The cheviots have been introduced, and, as might have been expected, are found to thrive prodigiously, and to increase rapidly, but it is a questionable proceeding which would replace the merino crossed with Leicester blood, yielding a fleece of fine wool of rather long staple, for a breed which, however hardy, is remarkable for the irregularity of quality in the wool throughout its fleece, and which scarcely bears a fleece heavier than that of the animal it supersedes.

The amount of increase realised from breeding flocks in Tasmania is dependent to a great extent upon the condition (as to flesh) and health of the ewes, upon the nature of the pastures as to abundance of grass, or the reverse, and upon the nature of the weather at the lambing season. On good, well-sheltered pastures, with ewes in fair condition, I have often seen upwards of 100 per cent. saved; if at any time the yield falls much below 80 per cent. there is ground for suspecting some mismanagement; if it falls below 50 per cent. gross defects of management must have existed. One of the most ordinary causes of failure of increase in sheep husbandry is the very prevalent custom of overstocking, so as to produce an unnatural delicacy of constitution in the animal.

Sheep farming, from the earliest times of the Australian settlements as the resort of free colonists, has been regarded as the most profitable mode of investing capital. In flocks where there is a fair proportion of breeding ewes, of wethers, and other dry sheep, the clip of wool is considered to be more than sufficient to defray all charges of management, and the value of the annual increase becomes the net measure of profit accruing. There have occurred some singular vicissitudes in the value of sheep in the Australian colonies. In 1839, prices were very high, in consequence of a large exportation for two or three years to the new colony of Port Philip, but in 1843 sheep were selling at 2s. 6d. per head in that settlement, and at the same time fetching very low prices in Tasmania. The boiling-down process was discovered, and immediately prices assumed a comparatively high figure, and small capitalists who had purchased extensively at the previous extremely low rates, found themselves suddenly converted into men of large fortune. Many Tasmanian settlers became at that period large proprietors of sheep in Victoria, and were proportionately enriched.

Whalefishing.

The insular position of Tasmania, the magnificent harbour which lies alongside its picturesquely situated metropolitan city of Hobart Town, the numerous sheltered channels, bays, and coves which indent the southern coast, and the great number of rivers which are navigable to a greater or less distance beyond their estuaries, have given to the inhabitants, and especially the youth of the island, a strong tendency to a nautical life, and has led from an early date in the history of the colony to the systematic prosecution of that bold and adventurous species of industry, whale fishing. This branch of industry has been carried on in two distinct forms; according to one, ships are fitted out, provisioned, and manned for a cruise of many months in various parts of the South Seas, expressly with a view to hunt and capture whales, and make prize of their oil, and the whalebone to be obtained in the case of the black whale; according to the other, the whale was only hunted along the shores of the island at the season when natural instincts led them to seek ease and retirement in quiet secluded bays or along sheltered shores. Bay-whaling, as the latter branch was termed, was prosecuted by boats' crews, furnished with every appliance for the chase, and for "trying out," as it is technically called, and placed at fixed points upon the coast; but it has, for more than ten years, ceased to be carried on, whales having become too wary to approach shores so fraught with danger to them, except in a few isolated cases.

The whaling vessels from the port of Hobart Town have, for many years, formed a not unimportant colonial marine of small craft, returning, as they often do, richly laden with the spoils of the deep.

The first notice which I have met with of export of oil from the colony is an entry of 726 tons in 1822. The following quotations will give an idea of the average annual yield of the Tasmanian whale-fisheries:—

	Vessels.	Tonnage.	Value of oil and whalebone.
1839	26	3,146	£119,113
1849	34	7,791	37,824
1859	No	return.	63,325

From which last entry it would seem that this branch of trade, has entirely recovered from the blow it received through the loss of crews at the time of the gold diggings.

Intimately associated with the subject of the whale fisheries is that of ship-building in Tasmania, a topic which, however, will be touched upon under another head.

Agricultural Products.

Wheat has been named as one of the staple products of the colony. In no part of the world is it raised with greater facility or of more excellent quality. There is now exhibited at the Crystal Palace, Sydenham, a sample grown by Mr. Axford, of Bothwell, Tasmania, which weighed 70 lbs. per imperial bushel. Samples sent to the London Exhibition of 1851, and to Paris in 1855, were pronounced to be of first-rate quality, and obtained medals. At Circular Head, and in other districts in the island, 50 bushels to the acre have been reaped. The average return, notwithstanding, is comparatively small, as it is not believed to exceed 20 bushels to the acre. The agriculturist possesses, however, in the equability of the seasons and in their genial character,—in the mildness of winter weather and the length of the winter day—and in the certainty of favourable weather during seed-time and harvest, more than an equivalent. Besides, there are the best reasons for believing that much of the wheat produced in the colony is grown on land which, from having borne one crop of wheat after another for a long series of years, has become partially exhausted, and that 20 bushels per acre would be very far below the average return under a skilful rotation and proper system of manuring. At present it is the boast of the Tasmanian farmer that ordinarily he applies no manure to his land. A few select farms, in various parts of the colony, such as "Clarendon," the estate of Mr.

J. Walker, on the Derwent river, and some few surburban farms, such as that managed by Mr. Shoobridge, in the close vicinity of Hobart Town, form marked exceptions to this slovenly and wasteful want of system, and make, both in cereals and root crops, the largest and heaviest returns for the liberal and judicious course of husbandry to which they are subjected. It is therefore a reflection on the farmers of Tasmania, rather than a disparagement to its soil or climate, to say that the return of wheat to the agriculturist is generally so much less than it ought to be. There is still another mode of explaining the occurrence of light crops. The best lands are usually the most heavily-timbered, and it has not at all times been convenient to the settler to select for cultivation the land best adapted to this object in preference to that which is naturally clear of trees, or nearly so. Hence it happens that there has been brought under corn tillage much land altogether unfit for the growth of wheat, without heavy aliment in the shape of manures, which it rarely or never obtains. The great advantages which the Tasmanian farmer enjoys in the fine weather of winter for out-door labours—of spring for his seed time, and of autumn for his harvest, as it relieves him of all anxiety, may well reconcile him to a comparatively light return, but it is not right that a deficiency arising out of defective farming should be attributed to the soil; let the onus rest on the right shoulders. The price of wheat is now, and has been for some years, dependent less upon the domestic relation between the quantity produced and the number of mouths to be fed, than upon the demand which the market at Melbourne may present. Indeed the Melbourne markets, it may be said, do now at all times most materially modify, if not absolutely rule, the prices of provisions in the neighbouring colonies. At the same time it is matter for congratulation to Tasmania, and her wheat producing rival, South Australia, that this Babel of the South does afford to them a market for every variety of agricultural produce which they can raise. Wheat has been sent from Tasmania to the London market on more occasions than one, when very low in price within the colony, and at a period antecedent to the existence of a gold colony in its neighbourhood, but although the quality of the grain was highly appreciated, never with a result to encourage the belief that such speculations might expand into the dimensions of a regular trade. The freight and charges consequent on a long voyage, and on exposure to many casualties, have invariably absorbed the whole margin left for profit. The colonial market may therefore be said to be the only outlet at present for Tasmanian wheat, but it is a market already making large demands, and widening from day to day with every addition to the digging population, and with every fresh advance colonisation makes in the direction of those regions in Australia where tropical heats forbid the attempt to cultivate the cereals of temperate climes.

Should the exigencies of the cotton supply for the workshops of Great Britain become so imminent as to demand the creation of a cotton-growing community within the territory of the empire, there could not probably be found any locality so well adapted, by natural conditions and geographical position, as Port Essington, or its neighuourhood, for the purpose. Whether a new colony may or may not grow out of the present cotton-supply-question, a community of British subjects must, in the ordinary course of things, flourish there at no distant date from this time; and in the event of such a contingency a new and permanent market will be opened up for Tasmanian produce, which must afterwards expand as population spreads east and west along the shores of the Australian continent.

Coral reefs in tropical seas have been found to present serious impediments to the integrity and permanent utility of submarine telegraph cables, and the question has already been mooted whether the line which is to connect the Australian colonies with Europe *via* Batavia, Singapore, and India, ought not to pass through the heart of Australia? The next step will be the project of carrying a line of railway or a wooden tramway, plated with iron, as has been extensively practised in America, across the Australian continent, from the upper navigable portion of the Victoria river to that point in the Murray river, towards which the Melbourne railway lines are now advancing. This would open a vast market for another important staple product (the blue gum and other timber) of Tasmania, and would bring this and the other Australian communities into close intercourse with the industrious and teeming populations of India, China, and Japan.

Were this the occasion for discussing such a point, there would be needed little argument to show that State policy demands of the Government the establishment of a British settlement on the north coast of Australia, and the formation of a naval station there, which might, as from a centre, radiate to India, China, the Oceanic Islands, and her Majesty's possessions in Australasia, at once to overawe the lawless and predatory hordes inhabiting the islands of the Archipelago, and to command and protect the commerce of the Straits, and of the existing Australian colonies,—but little argument would be needed to show that sound State policy would instantly decide the British Government to eliminate and permanently exclude from the midst of British people convicted offenders, who, when retained, must interfere with the home labour market in some degree, and when returned to and intermingled with the mass, must again, in the very nature of things, become criminal, and at length as a class, dangerous to society; and that, by their extrusion, not only would the criminals themselves be improved and made useful members of society elsewhere, but that the interests of humanity at large would be thereby consulted. Were more practical and more immediately urgent arguments required, the cotton-supply-question may be said to have arisen in order to furnish them, and to render the formation of a cotton-growing settlement on strictly British soil almost a matter of State necessity.

Communities so differently placed as would be colonies on the north and south of Australia would produce little in common; while, therefore, the cotton of the former would be forwarded home to aid in satisfying the requirements of Manchester and Glasgow, and to propitiate anti-slavery advocates and the friends of civilization, their coffee, sugar, and rice, &c., would be sent to Southern Australia and to Tasmania, to be exchanged against potatoes, oats, wheat, flour, and other products of temperate regions.

Reverting to the subject of wheat, I may state that within the last 20 years it has been sold in Hobart Town as low as 3s. 3d. per bushel, while the average price for the same period may be fixed at 6s. to 7s., a rate which, under the ordinary circumstances of wages, &c., pays the farmer well. The amount of wheat exported from the colony:—

In 1849, was 296,236 bushels, valued at £51,722.
,, 1859, ,, 196,405 ,, ,, £92,861.

The flour exported in 1859 was valued at £105,128. The price-current of 23rd January last, just received from the colony, quotes the price of prime samples of wheat at 7s. to 7s. 3d. the bushel. The cultivation of wheat admits, it may be added, of almost boundless extension in Tasmania, every probability being in favour of the opinion that the yet uncultivated portions of the colony contain lands of the richest character, and that as these are brought under tillage a very much higher average yield of wheat will be obtained, altogether independently of increment from improved modes of culture.

Oats.—Next to wheat, as an export, in the year 1859, stands oats. This grain is extensively grown on the higher agricultural estates in the centre of the island, and in the rich brown soils about Westbury and Deloraine. It may be considered a sure crop on moderately good soil in every part of the colony. It is said that 100 bushels per acre have been obtained from the

soil of some rich marsh land after drainage. The extent of land in cultivation with oats and the produce obtained run as follows :—

In 1849,	extent	19,214	acres,	yielding	456,015 bushels.
,, 1854,	,,	35,320	,,	,,	526,547 ,,
,, 1859,	,,	36,209	,,	,,	918,881 ,,

Making an average return of less than 24 bushels per acre, the probabilities being strong that the mean is considerably under the legitimate figure, in consequence of much of the land stated to be under oats in 1854 having been self-sown from the crop of the previous year.

The usual return from ordinary soils, and in situations adapted to the growth of this grain, may be taken at about 35 bushels to the acre. There is a sample of Tasmanian oats exhibited at the Crystal Palace, Sydenham, which weighed 49 lbs. per bushel—the yield having been 60 bushels to the acre. The value of oats exported in 1859 was £94,968. In the *Price Current* of 23rd of January last, from Hobart Town, the price quoted is 3s. per bushel. Barley is not a favourite crop with farmers in Tasmania. The variety known as Cape barley is grown pretty generally in the autumn and winter, in order to be cut very early in the season as green-feed for cattle, and the yield is usually rather heavy. The export of barley is trifling. Of other agricultural products, the most important is the Potato. This crop is chiefly cultivated along the estuaries of the rivers opening into Bass' Strait, and at Circular Head, Table Cape, and Emu Bay, on the north side of the island, and along the shores of D'Entrecasteaux Channel, the Huon River, Brown's River, and the Derwent River, near Hobart Town, on the southern side. The potato of Tasmania is far superior to that of any part of Australia or New Zealand; it is quite equal in point of dryness to the best potato grown in England, and very much to be preferred in flavour. The ordinary return obtained in its cultivation varies excessively; the diversity is due as much probably to varieties of tillage and treatment as to difference in the constitution of soils. A mean of the produce of the whole colony produces five tons to the acre; the best farmers do not expect more than seven or eight tons, but the yield in some cases is more than ten tons to the acre. In the Statistical Tables for 1859, it is stated that 7,777 acres of land, cropped with potatoes, yielded 41,493 tons:—

In 1849 the price of potatoes in the colony was £6 per ton.
,, 1854 ,, ,, ,, £25 to £30 ,,
,, 1859 potatoes were sold at . . . £3 and £4 ,,

In December, 1860, the last shipment from Hobart Town, 360 tons, sold at . . . . £8 8s. ,,
Potatoes were exported in 1857 to the value of £61,408.
,, ,, 1859 ,, £42,906.

The turnip crop is quite as hazardous in Tasmania as in England, but of far less critical importance to the farmer, live stock being by no means so dependent on housing and artificial food there as they are in England during the winter season. Mangold-wurtzel and carrots are both well suited to many Tasmanian soils, but are not much grown.

Hay.—English grasses are cultivated rather extensively for hay, and yield a fair return. As provender for horses it is always in demand for domestic consumption, and for the Melbourne market. The price in Hobart Town in December, 1860, was £4 and £6 per ton.

Butter and cheese were exported in the year 1859 to the value of £13,877. The dairy is rising in estimation among farmers as a source of profit; and the butter and cheese of Tasmania has acquired a high character in the neighbouring colonies. The last quotations at Hobart Town (23rd January) give for fresh butter 1s. 3d. to 1s. 6d., and for cheese 1s. 6d. to 1s. 9d.

It has lately been suggested, at a meeting of the Royal Society of Tasmania, that the climate of the Island is peculiarly well adapted for the mulberry tree and for the cultivation of the silk-worm. Food, it is said, would be abundant, as the tree would be in leaf the greater part of the year.

Live Stock.—Horses, sheep, cattle, and pigs were exported from Tasmania to the value of £60,900 in 1859.

The feats of Tasmanian horses on the turf early established for the colony the reputation of possessing the best blood and bone in the southern hemisphere. The late governor, Sir W. Denison, was a warm patron of the turf, and frequently went out with the hounds, proving himself as fearless as firm in the saddle. The gold of Victoria has now effected a transfer of much of the horse-flesh of Tasmania to the opposite shores. The number of horses in the colony, in 1859, was 20,559.

The breeds of cattle which have been introduced into the colony are the Durham or short-horn, the Hereford, the Ayrshire, the West Highland, and the Devon. These have all, at one time or other, and to a greater or less extent, been crossed with an original coarse long-horned variety, betraying Indian lineage or connection, and derived probably from New South Wales, in the very earliest times of the colony. The Durham is the favourite breed, but it carries a frame and carcase too large for the natural pastures, save in exceptional localities, and it is too delicate in constitution; the Ayrshire maintains in the colony its high reputation as a milch cow; but the Devon is by far the best adapted in frame, constitution, and kindly feeding properties, for the natural pastures of the island, and it is decidedly a comely animal. The kyloe, or West Highland breed, promises to yield a cross extremely well-suited for the wild, coarse, and humid feeding grounds to the westward. The number of horned cattle in the island in 1859, appears, by Government tables, to have been 79,950. Pigs are extensively cultivated by farmers of every degree. In the early times of the colony a few were allowed to run wild in the bush, where they lived chiefly on fern roots; they have long since been extirpated. The number in the colony, as per statistical return for 1859, was 32,008.

Fruit has within a few years acquired importance, as an article of export from the colony. Surplus apples used, in bygone times, to be converted into cider, which was given to sheep-shearers, haymakers, and harvest-men, or sold at a moderate rate. They are now sent to the Melbourne market, where the demand for them is increasing.

There are in the colony more than 100 varieties of apple; many of them are of finer flavour than the original sorts in England, and they attain to a larger size. There are of pears more than 50 varieties, and amongst them are some of the finest quality, and some of the longest keepers. There are 25 sorts of plum, 12 kinds of cherry, 6 apricots, 1 nectarine, 30 varieties of the vine, 6 kinds of the fig-tree, mulberry, medlars, almonds, many sorts of gooseberry, currants, raspberry, &c. Most of these fruit trees bear in great profusion, and the different fruits ripen more perfectly, and are thought to possess higher flavour than the same sorts in England. Peaches and plums are still often allowed to fall, and go to utter waste under the trees in large quantities, and so also with other fruits not unfrequently.

The value of fruits and preserves exported—

In the year 1849, amounted to £6,976.
,, ,, 1859, ,, ,, £62,430.

Timber.—The timber trade of Tasmania is one which within a comparatively short period of years, has assumed large proportions and great importance to the colony. In 1849, the year preceding the discovery of gold in Victoria, the value of the entire export of timber was £34,566. In 1853 it had risen to £443,000; in 1854 it was £306,857; but it again receded with the depression in prices generally in 1857, to £130,650, and in 1859 to £82,132.

The usual denominations of timber exported are, Sawn stuff:—Heavy scantling, joists, beams, quartering, battens, &c. Split stuff, post and rails and palings for fences, laths and shingles, round spars, beams for piles, telegraph poles, &c., &c.

The *Eucalyptus*, or Gum-tree family, contributes to this

supply a quota from each of several species. The south side of the island furnishes chiefly blue gum and stringy bark timber; the north chiefly swamp gum and stringy bark; but from both localities are obtained timber of other species of gumtree such as peppermint, white gum, &c. The blue gum grows exclusively upon the southern side and along the eastern sea-board of Tasmania, recurring on Flinders Island in Bass's Strait. Blue gum possesses the highest qualities as a timber applicable to every variety of work requiring strength and durability, coupled with the largest manageable size of scantling. The trees attain to 350 feet and upwards in height, and to a circumference sometimes exceeding 100 feet.

Planks of this wood were cut for the International Exhibitions at London in 1851, and Paris, 1855, having a width of 20 by 6 inches, which measured respectively 145 and 160 feet in length, a length which might be extended to 200 feet if specially required, as the trunk or bole of this tree often measures 220 feet and upwards to the first limb. There is, however, a practical difficulty in the shipment of such long lengths when ready, as few vessels can be found to stow them on board. The timber of the blue gum has been found nearly if not quite equal to oak for shipbuilding. Vessels of 400 to 500 tons burden and under constructed of it, have from time to time during many years been turned out of the ship-yards of Messrs. Degraves, Watson, Ross and McGregor, &c., at Hobart Town, and it is the proud boast of Tasmanian ship-owners that the age of the colony is not yet such as to have fairly tested the durability of this timber.

A series of carefully conducted experiments, by Mr. Mitchell, upon scantlings of blue gum, of the same dimensions as those employed by Captain Baker, in his experiment on Morung Saul, and of Professor Barlow, in his experiments on teak, and other timbers, have established the following comparative results:—

Specific gravity of	Blue Gum	. . =	1,090
,, ,,	Morung Saul	. =	1,054
,, ,,	English Oak	. =	969
,, ,,	Teak . .	. =	745

Elasticity remaining perfect, the deflection and weights sustained are:—

Blue Gum,	2,625 inches deflection,	and weight	776 lbs.
English Oak	1,590 ,,	,,	150 ,,
Morung Saul	1,175 ,,	,,	450 ,,
Teak	1,151 ,,	,,	300 ,,

The breaking weights of each in pounds were:—Blue gum, 1,330; morung saul, 1,192; English oak, 637; teak, 938. The value of direct cohesion on a square-inch of timber is:—Blue gum, 93,408; ash, 17,337; teak, 15,550; English oak, 10,853. These results exhibit a superiority in favour of blue gum so overwhelming as to distance all competition. It only remains to secure for the important practical purposes of ship-building, &c., &c., timber equally as well seasoned as the samples operated upon by Mr. Mitchell, to realize in its actual employment and use the full advantage of the high qualities it is found to possess. Were shippers of this timber bound by legal enactment in the colony to prove in each case that the timber has been cut and seasoned in the scantling for 5 years, it would, probably, be sufficient to protect the trade from the imposition of inferior samples, and the character of the timber from doubts and aspersions as to its superior value. Looking at the paramount superiority of this timber in the qualities most valuable for ship-building purposes, it may fairly be questioned whether full justice is done to its merits by the position (Class A 1, for 9 years) assigned by Lloyd's to ships built of it.

The enormous demand which has of late years arisen in England and other countries for railway sleepers of wood has suggested to Tasmanian colonists the advisability of proposing the employment of the blue gum of the colony, on account of its hardness, strength, and durability; and they urge that, as sleepers of blue gum can be supplied at 5s. or 5s. 6d. each, which would last more than double the time of the pine sleepers now in use, which cost 3s. 6d., a vast saving of outlay in money and labour would, by its adoption, be effected to the railway companies, &c. Several shipments of sleepers of the blue gum have recently been forwarded to London in order to their being put upon their trial. It would be but fair to the future character of the blue gum, that the extent of seasoning to which these sleepers have been subjected previous to shipment should be made known, so that if oversight or negligence has led to the export of green wood, any injury which the reputation of the timber might thus sustain may be obviated, and the recurrence of so objectionable a practice prevented. The blue gum has been used for telegraph poles, and found to answer well. The swamp gum, the stringy bark, the iron bark, &c., will be found scarcely, if at all, inferior in any useful quality to the blue gum when properly seasoned. This and other varieties of Eucalyptus abound to such an extent along the sea-board of Tasmania as to enable the colonists to say that these timbers can be supplied for an indefinite period of time in any quantity the mechanic world may require.

There are many varieties of trees in the forests of Tasmania, which yield woods for house-building fittings, implements, &c.; and there are others of great excellence and beauty for furniture and for purposes of the cabinet-maker. Some fine samples were sent to the London Exhibition of 1851, and to Paris in 1855, and there are now on view, at the Crystal Palace, Sydenham, a few superb specimens of the myrtle-wood *Fagus Cuninghamii*, and the musk-wood, *Eurybia argophylla*—the Black-wood, *Acacia melanoxylon*, and Huon pine, *Dacrydium Franklinii*, &c. Wherever seen, these ornamental timbers have been much and justly admired for their rich and harmonious tints and beautiful venation, and need only to become more extensively known in order to come into large demand in this market. The source of supply, I may add, is, to all practical intents inexhaustible.

Kino, an important medicinal agent, is obtained from all the Eucalypti in large quantity.

Manna, white, and more delicate than that in common use, exudes plentifully from the white gum tree.

Cajeput Oil, or an oil of the same powerful qualities, is procured, by distillation, from the leaves of the blue gum tree. Next to timbers may be ranked the

Building Stones of Tasmania. Amongst them there are granite, white and red—the latter of a vivid tint, and susceptible of a very fine polish.

Sandstone of close, fine grain, compact, and often of a snowy whiteness, is plentiful; buildings constructed of it, as many of the houses in the colony are, present a fine appearance. Such as are used for building, are chiefly of the carboniferous era.

Limestones belonging to the silurian, carboniferous, and tertiary periods, are largely developed and readily available for the purposes of the farmer and builder.

Stone has begun to appear amongst the exports of the colony. In 1859 the value shipped was £2,740.

Coal occurs rather abundantly in Tasmania, and is of two sorts, anthracite and bituminous coal. The localities in which they have been found, are the bituminous coal, at the Mersey and Don rivers, north side of the island; at Kingston, Fingal, Break-o'day, Douglas River, Schouten Island, and at Prosser's Plains, on the east coast; and at Jerusalem, Jericho, Springhill, Green Ponds, and Hamilton, inland, on the southern side.

The anthracite has been found in Tasman's Peninsula—at Adventure Bay, at Long Bay, at Recherche Bay, at South-east Cape, and at New Town, immediately contiguous to Hobart Town. The anthracite beds at Tasman's Peninsula and at New Town are worked for domestic consumption in Hobart Town. The bituminous coal at Break-o'day, and the Douglas River, occurs in beds of from two to ten feet in thickness, and the quality was so favourably reported of by the late Sir H. De La Beche, as to lead to the establishment of mining operations. The

bituminous coal at the Mersey River has also been worked. The coal near Hamilton is on the estate of Mr. Chilton, and was discovered at a depth of forty feet from the surface, in the process of sinking a well in his farm-yard. It is a fine free-burning coal, with high-heating powers; and the seam is four feet thick where it was intersected. It is distant from the City and Port of Hobart Town a little over forty miles, and from the head of the steam-navigation, on the River Derwent, about twenty miles. It is therefore to be hoped that a scheme may be organised for working and conveying it, by means of an iron railway, or plated tramway, to New Norfolk, whence it might be taken by steamer to Hobart Town. A fuel so well adapted for steam purposes, the production of gas, and for the forge, would find a ready and extensive market there. The existence of coal at so many points in the island, argues its persistence over a considerable area of country, and foreshadows, with tolerable certainty, the rise and progress of a career of manufacturing industry in the future of Tasmania.

Clay Iron-stone occurs in these seams, and in nodules alternating with coal and shales at the Douglas River, on the east coast of the island,—an association big with promise and coming prosperity and greatness for the country.

An iron ore yielding upwards of 90 per cent. of metal, occurs at York Town, on the Tamar River, near the foot of the Asbestos hills, where it is associated with ancient slates on one hand, with limestone, serpentine, and asbestos on the other; and it is thought that coal may yet be found in the same neighbourhood. Here are the elements of wealth and power on the margin of a navigable river; Anglo-Saxon industry, enterprise, and capital, will ere long develop their capabilities.

Galena.—Lead ore has been found in limestone at Norfolk plains, associated with traces of copper, upon land the property of Mr. Abraham Walker, but the indications have not been prosecuted so as to determine the value of the deposit. As long ago as 1847, while out on a geological excursion, I discovered in limestone a vein of Galena crossing the bed of the Franklin River near Macquarie Harbour, on the west coast of Tasmania, and several miles higher up the river I again met with traces of the same metal in veins of calspar. On the west side of the Frenchman's Cap mountain-chain, I found oxide of manganese in detached masses over slate rocks, associated with silicious limestone, apparently of great antiquity, and likely to prove metalliferous.

Gold has been washed out of the detritus from old slate rocks, at various points over a large area of country at Fingal, and along the upper stream of the South Esk and the Tyne River. Gold has also been washed out in the central lower valley at Perth, Hadspen, Lake River bridge, Norfolk Plains, at the Arms of the Creek, in the Channel of the South Esk, within three miles of Launceston, and near Mount Direction, on the east side of the Tamar River.

Gold has also been found on the Forth River, and on the Hellyer River, near the Van Dieman's Land Company's lands in the north-west. Gold has likewise been got by washing near Oyster Cove, on the margin of D'Entrecasteaux Channel. Both labour and capital have been expended in a search, hitherto in vain, for a payable gold field. Many of the diggers at Fingal have doubtless collected enough of the precious metal to pay expenses, and to enable them to make a handsome saving; but the majority of them have relinquished the pursuit, disgusted with the profitless nature of the work. I have seen grains of gold washed from soil taken up within a few inches of the surface, and I myself have picked up a granular piece the size of a small tare or large pin's head, under a loose surface-slab of slate. Still gold washing in Tasmania does not pay, more than 20s. being usually expended in realising the worth of a sovereign in gold dust. Quartz-crushing companies have also been tried, and proved a failure. Happily for Tasmania, there are within her territory numerous sources of national wealth and prosperity for the employment of industry far more profitable and more permanent than that of gold seeking, which has ever been found unnaturally to excite and disorganise the working classes of a population, and to foster in the upper classes habits of great luxury and extravagance.

Gems.—Tasmania yields a few gems of great beauty and brilliancy. Specimens sent to the London and Paris Exhibitions of 1851 and 1855 attracted some notice. They consist of topaz, beryl, hyacinth, garnet, cairngorm, rock crystal, tourmaline, precious opal, with common wood opal, agates, and cornelians in great abundance. The topaz, tourmaline, beryl, hyacinth, and rock crystal are now found imbedded in gravel over granite, on Flinder's Island and Cape Barren Island, in Bass Strait, but as there are upon the mainland of Tasmania considerable developments of granite, of the same schorly character as that upon which the topaz gravel and rock crystal, &c., are found on the islands in Bass Strait, it is not unlikely that similar gems may also be found here. Cairngorms do certainly occur on the mainland of Tasmania, both of good tint and large size. The Tasmanian topaz is now so well-known as a gem of the finest water, and of brilliancy scarcely inferior to that of the diamond, that nothing need be said in its commendation. Garnet occurs in granite on the east coast of Tasmania. Hyacinth occurs with topaz and beryl on the islands in Bass Strait, and is scarce. Rock crystal is plentiful in the same localities.

On the *Fauna* of Tasmania but few remarks are needed: in general character it resembles that of Australia. The splendid and most accurately illustrated works of Mr. Gould, have made the world of science and of taste acquainted with the forms and colouring of nearly all the birds and mammals of both countries. Of the marsupial mammals the *Thylacinus cynocephalus* (*Tiger* or *Hyæna* of the colonists), and the *Dasyurus ursinus* (or *Devil* of the colonists), are peculiar to Tasmania, and both are destructive to flocks, the former to the adult sheep, and the latter to lambs; but as they only inhabit the wildest and less accessible portions of the country, they are not troublesome or injurious to flocks generally over the island. Specimens of these two animals may be seen at the Zoological Gardens, in Regent's-park. The large Kangaroo, of the Island *Macropus Major* (Shaw)—the "Forester" of colonists, is fast becoming very scarce. The Brush Kangaroo and the Wallabry are hunted and killed in great numbers.

The black and grey opossum are shot on moonlight nights for the sake of their skins, which are exported to be dressed and used as furs, for which purpose they possess, I am assured, peculiar recommendations.

Of the birds of Tasmania, the largest is the emu, *Dromaius Novæ Hollandiæ* (Gould), and this interest attaches to it—that, in common with the aborigines of the island, it is almost extinct. The only genuine Tasmanian emus are in possession of Captain Robert Hepburn, R.N., of Roy's Hill, St. Paul's Plains, Tasmania, by whom they have been carefully reared in a preserve for many years, the breed having been obtained, in the first instance, from eggs found in the "bush." The most elegant and beautiful of the larger birds is the white hawk, *Astur Novæ Hollandiæ* (Gould). The sportsman will find in Tasmania a considerable variety of game birds; for instance, the snipe, quail, bronze pigeon; vars of duck and teal; cereopsis, plover, rail, bittern, anthochæra, &c.

Of the parrot tribe, which is numerous in the colony, the most showy species is the Roselle, *Platycercas eximius* (Gould); and the most elegant, the Ground Parakeet, *Pezoporus formosus* (Gould).

There is but one representative of the Finch tribe, and it is a cage-favourite—the Fire-tail, *Estrelda bella* (Gould).

All the domesticated poultry of England, from the peacock to the bantam, and sundry varieties of pigeons, have been introduced, and thrive immensely, with very little attention in the way of feeding. Some game-birds of England have been introduced, and are kept in preserves, it having been found that as often as they are

turned out they are shot by poachers and killed by wild cats; amongst them the pheasant and partridge, white swan, &c.

The seas surrounding Tasmania abound with a great variety of fishes, many of which being firm in flesh and of delicate flavour, make choice dishes for the table. The trumpeter, the perch, the flounder, the rock-cod, the mullet, the garfish, &c., &c., are all in estimation; shell-fish—oysters, mussels, cockles, periwinkles, &c., are plentiful.

The Hobart Town market is plentifully supplied with the finest cray-fish.

There is a great deficiency, however, of fresh water fishes, those already referred to belonging exclusively to salt water, or only venturing to leave it to visit temporarily the estuaries of the rivers. There is only one trout found in the rivers and it rarely attains to a greater length than 6 or 8 inches.

Salmon.—A desire having arisen in Tasmania to obtain the breed of salmon for the rivers of the island, which are supposed to be of a character and temperature, and to open into seas in every way suitable to the nature and requirements of that fish, two attempts have been made to compass the object, but both failed. The first trial, made by Mr. Boccius, under the auspices of the Secretary of State, failed signally. The arrangements for the second experiment were organized under the eye and direction of Mr. James Youle, (an influential colonist of Tasmania) and the charges defrayed by subscription. This also proved a failure although the result was such as to lead to the belief that if a larger quantity of ice had been shipped, so as to keep down the temperature till the voyage terminated, the ova might have remained unhatched till landed, when the success must have been considered as almost secured. The Derwent and Huon rivers, on the south side, the Gordon on the west, and the Mersey, the Forth, and the South Esk may be regarded *à priori* as salmon rivers of the most promising description. But the rivers on the south, and the first of them the Derwent, should have the preference in case of further experiment, as the noble estuary, itself a little sea, opens into an ocean cooled by currents direct from the polar regions, whereas the northern rivers, however suitable in other respects, have the disadvantage of opening into a strait whose waters have had their temperature considerably raised.

The parliament of Tasmania have voted £2,000 to defray the expenses of another attempt, and the Colonial Government has committed the entire charge, conduct, and responsibility of the arrangements to the Australian and New Zealand Association in London, of which Mr. Youle and other Tasmanians are active members.

English carp and tench have been introduced into the colony, and it has been suggested that advantage might be taken of the person proceeding in charge of the next salmon experiment to place in his care a quantity of trout, with which to stock the rivers of the island.

Land Regulations.—Remarks upon game and fishes, intimately connected as they are with the rights of landlords, lead naturally to the subject of land, as regards its possession and property. It is perhaps the one great aim of emigrants, who leave their native country without a distinct intention of returning, to entertain an idea, more or less clear and defined, of making themselves landed proprietors. Such being the case, it is important to set out, in a few words, the terms upon which Crown or Public lands can be obtained in Tasmania. The Public lands of the colony are classified under three heads, viz.:—

Town Lots;
Country or Agricultural Lots;
And Pastoral Lands.

And there is, in the Western Country, a tract designated as "Unsettled Lands."

Town Lots must be sold at auction; and if sold for cash, one-fifth must be paid down, and the residue within a month; if for credit, then one-tenth is added to the price, and the sum becomes the purchase money, of which one-fourth must be paid down, and the residue by three equal annual payments.

Country or Agricultural Lots, not exceeding 160 acres, and Pastoral Lots, not exceeding 1,280 acres, are to be sold at auction, or lands may, under certain conditions, be purchased from Government by private contract. Lands exposed at auction and remaining unsold may be purchased by private contract, at any time within twelve months, at the upset price. Lots of agricultural or pastoral lands, of 320 acres or under, and which have not been offered at auction or let on hire since 1st December, 1857, may be purchased by private contract at £1 per acre. The lowest upset price of land, never held under a grazing license, is fixed at 10s. per acre. The payments for agricultural and pastoral lands, if sold for cash, must be one-fifth at time of sale and the balance within a month; if sold for credit, whether by auction or by private contract, then one-fifth of the purchase money must be added as a premium, when the original sum and premium together shall constitute the price of the land, of which one-fifth must be paid down, and the residue in eight equal annual instalments. Credit may be obtained for purchases of not less than £40 value, and unpaid balances may be paid off at any time during the period of credit fixed by regulation.

The Unsettled Lands are disposable on terms yet more liberal. Gratuitous grants of 50 to 640 acres are made to *bona fide* settlers, in proportion to the capital they possess, live stock, implements of husbandry, machinery, &c., being reckoned as capital. Blocks of 10,000 acres of the unsettled lands may be obtained on gratuitous leases for 10 years, that is at a peppercorn rent, with right of selection for purchase of 640 acres of the same at £1 per acre. It will be seen at a glance that these regulations are calculated generally to subserve the interests of purchasers and occupants of land, and that they are peculiarly adapted to suit the convenience of emigrants and others possessed of small means and burthened with large families, since such persons, accordingly as they take advantage of one or other, may secure to themselves the full use of their capital for years on the credit system, or save the outlay altogether by embracing the principle of the gratuitous grant in proportion to property.

Revenue.

The aggregate amount of exports from Tasmania was valued in 1859 at	£1,833,249	0	0	and
The imports for ditto at . . .	1,675,417	0	0	
The revenue for ditto was . .	429,426	4	7	
The expenditure for ditto was .	422,588	14	3	

In the latter two items are included certain credits and debits on account of debentures issued and public securities falling due and paid off within the year.

The public debt of the colony amounted, on 31st December, 1860, to £358,560, payable at various dates extending to about 1880, and so provided for as not to exceed in amount the sum of £25,000 in any single year. There are five banks in Hobart Town, three having a colonial and two an English proprietory. The coin and bullion in the banks on 31st December, 1859, amounted to £270,194 19s. 8d. There are branches of both the British and two of the Colonial banks established in Launceston. There are also savings banks in Hobart Town, Launceston, and in the rural districts. By late Hobart Town newspapers, ice appears as a new export to Sydney; it is obtained by collecting snow on Mount Wellington during the winter season. By the constitution of the colony a yearly sum of £15,000 is secured for ecclesiastical purposes from the general revenue of the colony; the actual expenditure on account of religion in 1859 was £14,666 7s. 3d.

Social Condition.

Education receives in the colony the important consider-

ation and all the support which a subject involving such momentous results and grave responsibilities demands. There are two boards of education, one for Launceston and the north side of the island, the other for Hobart Town and the southern side, and with them rests the entire management and control of the government schools (80 in number) throughout the colony. There are in the city of Hobart Town, unconnected with government, two seminaries, affording education of a high order to the youth of the colony, the Hutchins School and the High School, and about 40 respectable schools scattered through town and country. At the Hutchins School and High School several scholarships are established. The Parliament of Tasmania has lately constituted a superior Council of Education, with power to grant a degree of Associate of Arts, and has, with a liberality which cannot be too highly praised, established 8 scholarships of £200 a year each, tenable for 4 years at British Universities, by youths of Tasmania who may acquit themselves to the satisfaction of the Board of Examiners. The Queen's Orphan School, solely upheld at the charge of the public, maintains and educates 400 boys and girls left destitute. Education is therefore well appreciated, and its requirements amply provided for. The Government expenditure on account of schools in 1859, was £15,342. The principal towns in Tasmania are—

The metropolitan city of Hobart Town at the south, and Launceston at the north-end of the island.

An electric telegraph, in operation between these towns, has been extended through Bass's Strait by means of a submarine cable.

Launceston is situated at the head of the valley, and navigation of the river Tamar, where the North and South Esk unite to form that river at a point 40 miles from Bass's Strait, into which it empties itself. The town, which contains 8,000 inhabitants, has increased much of late years, and is still advancing rapidly, having apparently imbibed some of the enterprising spirit animating the population of Melbourne, with which it is in close intercourse by means of steamers. The country surrounding Launceston is almost on every side nearly level, and of a rich and productive agricultural character. It possesses some handsome buildings. It cannot be said to compete with Hobart Town in natural beauty of situation, but the gardens and promenades are well-designed and tastefully laid out, and ornamented; and it is only second to the capital in its support of learned societies, Mechanics' Institutes, Mutual Benefit Societies, &c.

Hobart Town, the capital of the island, is the cathedral city of the Anglican Episcopate of Tasmania, and there is a Roman Catholic Bishop, who derives from it his title. The inhabitants number about 25,000. It contains the nucleus of a noble public library, partly supported from Government Funds. There are in Hobart Town many scientific and liberal institutions and associations to promote improvement and mutual benefit, supported in a manner highly creditable to any country. It possesses, in the Gardens of the Royal Society of Tasmania, situated in the Queen's Park, a public promenade, which, for natural and picturesque beauty of situation on the margin of the river Derwent, for graceful indulations of surface and tasteful arrangement and design, as well as variety of contents, can scarcely be surpassed. There, in the open air, the orange, citron, lemon, and pomegranate may be seen bearing their rich fruits, with the india-rubber tree 25 feet on the one hand, and black and red currant bushes, &c., inhabitants of cold climes, heavy with fruit, on the other.

Contiguous to the Royal Society's gardens, stands upon a commanding position, the new government house, surrounded with charming grounds, tastefully laid out and planted, the palatial residence of Sir H. E. F. Young, the present governor. It was built at a cost of £60,000.

The government-offices, courts, &c., in Hobart Town, are constructed of beautifully white hewn stone, and form a massive quadrangle and handsome lines of buildings. Churches and other public edifices, and whole streets of private residences, are built of the same stone, and have a fine appearance. Placed at the very foot of Mount Wellington (rising to above 4,000 feet), with the estuary of the Derwent, three miles in width, by its side,—a capacious, deep, and tranquil bay, wide enough to float the navies of the world, Hobart Town sits the Queen of Cities, blessed in the possession and enjoyment of the first situation, the finest harbour, and the finest climate of the world,—the capital of fair Tasmania,—a land containing within her bowels the elements of future greatness and of national supremacy—a land whose wild mountains and picturesque hills are warm and bright with sunshine, whose soft valleys are fertile, and ever green, under the influence of genial seasons, and in whose bosom are sons as manly, noble, and generous-minded, as her daughters are fair, virtuous, and accomplished.

DISCUSSION.

Mr. John Youl (responding to the invitation of the Chairman) said—About 80 days since, he was travelling in Tasmania amongst myrtle trees of which the slab upon the table was a specimen. The trees themselves were extremely beautiful, and whole forests of the myrtle tree extended for an unbroken distance of fifty miles, impenetrable to man or beast. The ground upon which these trees grew was of the richest possible description, and the exuberance of the vegetation constituting the undergrowth of these forests was almost incredible. A friend of his, on one occasion, had the curiosity to count the number of trees growing upon an acre of land which was about to be cleared, and he found there were no fewer than 3,000; and yet the hardy pioneers of the country were working their way into the forest in a wonderful manner, and were making great progress, though the land was thickly covered with these beautiful trees. But, perhaps the most extraordinary feature of Tasmania was, the extensive lakes, mentioned in the paper as existing on the tops of the mountains; and he thought the future of Tasmania was a good deal bound up with the irrigation which was at the present time about to be carried out upon the rich land of the country from those lakes, some of which were at an elevation of nearly 3,000 feet above the level of the sea. The depth of these lakes was in some cases extraordinary. Lake St. Clair, from which the River Derwent took its rise, had recently been sounded, and found to be of a depth in many places of 75 fathoms. Another most attractive feature of Tasmania was, that it grew all those vegetables and fruits with which an Englishman was familiar—the gooseberry, the currant, the raspberry, the apple, the pear, grew to the greatest perfection in that country. In fact he almost thought people had never tasted apples in perfection until they had eaten them in Tasmania. Then, again, the potatoe, the cabbage, the cauliflower, and every description of salad, grew to great perfection. As far as the farming operations were concerned it only required the exercise of common industry for any man to get on exceedingly well in that country. The yield of crops to persons who farmed in anything like a proper way, was larger than in any other country with which he was acquainted. The climate was extremely regular and highly congenial to agricultural pursuits, and he could state that, during the 25 years he was in the country, he never had a failure of a crop which had been cultivated with an ordinary degree of care.

Mr. F. Lawrence remarked that 3,000 trees per acre was nearly equal to one tree for every square yard.

Mr. James Oldham said the size to which the myrtle-tree grew might be judged of by the slab upon the table. An acre of land only consisted of 4,840 square yards, and it seemed incredible that 3,000 trees of that size should be found upon that space.

Mr. Youl explained that all the trees were not of the

size of the specimen on the table; most of them were much smaller, and many were mere scrub-wood and undergrowth. Trees of the size from which that slab was cut would not be found to exceed 50 or 100 per acre.

Mr. S. R. Solly, F.R.S., inquired whether the apples, pears, and other fruits spoken of were indigenous to the country, or whether they had been imported.

Mr. Youl replied that they had been introduced from this country, but the climate of Tasmania was admirably adapted for the growth of these fruits in the highest state of perfection.

Mr. Eugene Rimmel wished to ask Dr. Milligan whether he could give any information respecting the growth of flowers, aromatic plants, and woods for the purposes of perfumery. He had read, in the *Technologist* of last month, a statement that at the meeting of the Royal Society of Tasmania in December, a paper was read by Mr. W. Archer, the Secretary, upon the plants indigenous to the country, and applicable to the purposes of perfumery, such as the sassafras, the fragrant hound's-tongue, and several species of the acacia, such as the *Acacia Farnesiana*, the French cassie, from which a most valuable essential oil was extracted, and the flowers were sold at a high price. Several kinds of wood were also mentioned, amongst which were the musk-wood; and if it possessed the musk odour it would be extremely valuable. In order to give a commercial value to these plants and flowers, they must be procured in large quantities, and the expense of cultivation must not be too great. Perhaps, as the price of labour was very high in that country, the cultivation of those plants might not be a good speculation; but it was to be borne in mind that two-thirds of the operations might be carried on by female labour. Mr. Archer, in his paper, in speaking of the probable supply of these plants, said:—"Of the substances named he thought that the following might be obtained in sufficient quantities to constitute them articles of commerce; viz., the flowers of the sassafras, different species of acacia, the honeysuckle tree, the native lily, and the fragrant houndstongue; the leaves of rutaceous shrubs, of plants of the myrtle tribe, of the musk tree (*Eurybia argophylla*), and of several plants of the mint tribe; the wood of the native box, and of the box-leaved Alyxia, and the bark of the sassafras."

Dr. Milligan was not prepared to answer the inquiries of Mr. Rimmel, further than to say that the acacia and sassafras grew in great abundance in almost every part of the country, particularly amongst the large mountain trees and in the forests, from the north-west to the south-west extremity of the island. The musk-wood was found in great abundance all over the same district. He had not seen the paper alluded to by Mr. Rimmel. The wood of the *Elixir buccifolia* was not found in any great abundance, but it was one of the most deliciously fragrant woods he had ever met with. It grew chiefly upon the northern and eastern sea coast, and, though extremely valuable, could not be considered in its present supply of any great commercial importance.

Mr. Wm. Hawes said this paper must be regarded as one of a series which had been read before this Society, during the last few Sessions, upon our various colonies; but it was not a paper the interest of which was dependent upon the production, in Tasmania, of a particular fruit or flower; the great merit of the paper was that it had brought before them the advantages which that country possessed, in the opinion of the author, over some other colonies as a place for future emigrants. He had shown that the climate of this island of Tasmania was almost superior to that of our own country, and that there were a greater number of fine days in the year than in England, although England itself was remarkable for the large number of days in the year on an average favourable for out-door occupation. They were told (and the facts mentioned went abundantly to prove it) that not only did timber grow most luxuriantly, but that the wood was extremely valuable, and was capable of improvement by further cultivation. Wool was produced in great abundance and of fine quality; and the rivers were such as to afford ample means of communication as population extended; therefore they might look upon this paper as a valuable production, filling up a gap which had been left in the history of our various colonies, and one of a series upon kindred subjects which this Society had been instrumental in bringing before the public. He thought they must all be struck with the view which Dr. Milligan had taken upon the question of convict transportation to our colonies. He (Mr. Hawes) recollected that in the colony with which he was more particularly connected—the Cape—when it was proposed to send the best class of convicts there, so great was the prejudice of the inhabitants against the measure, so strong their determination not to admit convicts, that the governor, who was supposed to be favourable to their introduction, was for a time almost unable to obtain a supply of the necessaries of life; so powerful was the combination against all who were favourable to this measure. The inhabitants at the time appeared to forget that labour was very dear, and that convict labour could be advantageously applied to the construction of roads, bridges, and the other public works so important in a new settlement. Looking, however, at the facts as presented in other colonies, they must admit that convict labour had been of great service; and he gathered from the paper that it was the opinion of Dr. Milligan that not only had transportation been beneficial to the colony but also to the convicts themselves; men transported from this country, in a few years obtained their liberty, and became merged in the general colonial population, becoming industrious, steady, and capable of discharging the various duties of life. If that were the case the facts were of much importance, and he therefore hoped this paper would not only be extensively circulated amongst the members of the society in this country but also amongst the population inhabiting in our colonial possessions, for he believed that great good would be done by showing, from reliable statistics, that convict labour had been of great service to our colonies. There was another point in the paper which struck him, namely, the great advantage of these growing colonies to the mother country. They found that the increase in sheep in Tasmania was going on in a ratio more rapid than was the case in most other colonies. It had been stated that eight sheep per acre could be supported in this colony, which was greatly beyond anything he had heard of before.

Dr. Milligan explained that that was upon the irrigated pastures: this could not be done in uncultivated land, and was stated rather in contrast to the natural state of the country. The average might be taken as one sheep to two acres, throughout the Australian colonies.

Mr. Hawes remarked that that was below the average of some other colonies. It was, however, quite clear, from the facts which had been laid before them, that the climate of Tasmania was highly favourable for the production of wool, as well as other articles, useful to this country. He could not help referring particularly to one description of wood mentioned, viz., the blue gum-tree. In South Africa they owed to this colony the introduction of the blue gum-tree. It was remarkable for the rapidity and regularity with which it grew, and was a valuable wood when grown. The growth of this tree in South Africa was at the rate of ten feet in height per annum. A tree growing for ten years would attain a height of seventy feet, and would be twelve to fifteen inches in diameter at the bottom, with a straight stem, with few branches, and those high up—a perfectly sound, solid, useful wood, and its durability, according to Dr. Milligan, was as remarkable as the rapidity with which it grew. The introduction of that tree into the Cape was of the greatest importance, and had been the means of converting a country, previously almost without a tree, into a well-wooded region. As regarded fruits and vegetable products, he believed other colonies rivalled Tasmania. They must feel greatly

obliged to Dr. Milligan for having brought this subject so ably before them.

Mr. P. L. Simmonds said that having given some attention to colonial subjects for many years, he most heartily concurred in the terms of commendation bestowed on Dr. Milligan's paper by Mr. Hawes. It was a paper the historical research, scientific detail, and statistical information of which could only be thoroughly appreciated by quiet and careful study, instead of in the abridged form in which it had necessarily been read that evening. Such papers, diffused through the medium of the Society, did much to place the colonies fully and fairly before the British public, in the absence of those colonial agents in London who were formerly retained by the principal colonies to advocate their interests and to furnish information as to their capabilities, resources, and requirements. While doing full justice to Tasmania, Dr. Milligan had done so without making invidious comparisons with other colonies. The timber resources of Tasmania, extensive as they were, had scarcely had justice done to them in this country—and yet its woods were most important, as the information given by Dr. Milligan, and the samples before them, evidenced. Blue gum was already exported from the colony to the value of £250,000 a year, and this amount might be easily quadrupled if it found a European market. Tasmania was pursuing a wise course in the large amount of information they were diffusing throughout Europe by their collection of products at the International Exhibitions, and at the Crystal Palace, by such admirable official hand-boooks as that of Mr. Hull. The present paper was the more *apropos*, as Sir W. Hooker, in his report on the Paris Exhibition, had spoken rather disparagingly of the collection of Tasmanian raw products shown there, which he considered inferior to that exhibited in Hyde Park in 1851. He (Mr. Simmonds) was not present at the Paris Exhibition, but, judging from the catalogues, number of exhibitors, space occupied, and articles shown, the colony was by no means badly represented on many points. It stood second of the Australian colonies, and far before the more wealthy colony of Victoria, occupying 429 superficial feet of space, and numbering 118 exhibitors. It was so far an evidence of progress, that the four colonies which did show at Paris covered with their products nearly double the amount of space occupied by all the Australian colonies in 1851; and he trusted to see the colony maintaining its position by evincing an equal desire to stand well before the public in 1862. Judging from the interest manifested in the island journals, there was little doubt of Tasmania occupying a creditable position; and, as was well observed in one of their latest colonial daily journals, the colony could not direct its attention to any subject of equal importance with the display of those native products that were capable of being converted into articles of common use. The approaching Exhibition of Industry might be turned to most serviceable account by being made to illustrate the ample and varied natural wealth of the colonies. The previous Exhibitions had, no doubt, stimulated the operations of trade, by giving wider publicity to the various resources of different nations, and by opening new markets to their produce. This was the special benefit these great Industrial Congresses conferred upon young countries and new industries.

Mr. Parker said there was one question of Mr. Rimmel's, with regard to the cultivation of flowers and plants for perfumery, to which no reply had been given by Dr. Milligan. It had been said that a great deal of this operation could be carried on by female labour, but Mr. Rimmel must have forgotten that, unlike England, labour, both male and female, was very scarce, particularly the latter. He saw a letter from the Bishop of Tasmania, in which he stated he was obliged to clean his own boots. During the gold mania there was an immense demand for all descriptions of female labour, and the government of the colony was spending several thousands a year to induce female immigration. He therefore apprehended that they could not look to the cultivation of flowers for perfumery being carried on by the female population of the colony for a very long time to come.

The Chairman thought they would all agree that they were much indebted to Dr. Milligan for the very able and interesting paper he had read. It was one which, in his opinion, ought to be generally circulated, as it was a valuable addition to their colonial information; and he thought the colony of Tasmania, which it was his good fortune to have visited a few years ago, was one which of all others was best fitted, from a variety of circumstances, for either an English gentleman or an English labourer to dwell in. Labour was very valuable there. No man with the slightest energy could have the excuse of not being able, with the greatest ease, not only to earn his daily bread, but also a considerable amount of money, which he could either lay by for future years, or employ in the improvement of his social position. It was also a colony in which an Englishman would, perhaps, feel himself particularly at home, from the associations he would meet with on all sides, and from the strong English feeling which existed there, as well as from the circumstances of the climate, soil, and general features of the country, which would not remind him of his absence from his native land. It was a country in which association with the present colonists would immediately make him think he was amongst his own friends and fellow kinsmen at home. There were several points touched upon in the paper as to the resources of the country. The question of timber was a very important one to this country, inasmuch as timber for ship-building purposes was greatly needed, both for the royal and merchant navies. The description of timber most required was not so much the long straight planking, as that of a knotted and hard quality, suited for the knees and bends of vessels. In this respect the timber produced in Tasmania was peculiarly suitable, and it also possessed the valuable quality of never having been known to suffer from dry rot. It would also be valuable for railway sleepers and telegraph posts, which were every day more and more required. He (the Chairman) had endeavoured to introduce the blue gum tree into this country, and had planted out saplings raised from seed. He found that the plants from the seeds obtained from Tasmania did not stand the severity of our winters so well as those raised from the seed of a species of gum from Victoria. The trees acquired in four or five years' growth a height of nearly 20 feet, being only sheltered during winter by a mat covering. He believed the tree could be easily acclimatised in this country, and he had no doubt it would thrive best in the south-west parts of England, where the frosts were not generally so severe as in some other districts, and thus its growth might be extended over the country, and it would form a valuable addition to our present varieties of timber. Another point of interest was the cultivation of the silkworm in this colony. From all he had observed, he quite agreed with the opinion of Dr. Milligan, that it would be attended with success, and that the green leaves of the mulberry tree could be obtained throughout the greater portion of the year, by a succession of crops, for the food of the silk worms. Another question was the attempted introduction of salmon into the rivers of this colony, a matter in which his friend Mr. Youl had taken so active a part. He believed the last experiment failed only in consequence of an insufficient quantity of ice for the protection of the ova during the passage through the hot latitudes. He was glad to find that the attempt to introduce that fish was to be renewed, and if successful, it would add very materially to the wealth of the colony; and the fine sport of salmon fishery might be engaged in in Tasmania as it was in the Tweed at the present day. All these things together afforded a most encouraging view of the future of Tasmania. He would express a hope that this paper would be largely circulated, through the means of the So-

ciety's *Journal*, for the general benefit of our colonies, and the advantage of this country. He was sure they would all agree in according their thanks to Dr. Milligan for his very able paper.

The vote of thanks was then passed.

The paper was illustrated by some pictures of Tasmania, kindly contributed by Dr. Price, from the Tasmanian Court of the Crystal Palace, with specimens of the fine wool of the colony, of the Tasmanian myrtle (*Fagus Cunninghamii*), the celebrated Huon pine, the musk tree, and other ornamental cabinet woods. Dr. Milligan exhibited a handsome rug of the skin of the black opossum, and a collection of gems, amongst which were topazes of the first water, cairngorms of large size, and others.

The Secretary announced that on Wednesday evening next, the 17th inst, a Paper by Mr. J. Crawford, late Governor of Singapore, "On Cotton Supply," would be read. On this evening Sir J. P. Kay Shuttleworth, Bart., will preside.

ROYAL NATIONAL LIFE-BOAT INSTITUTION.

The following is an abstract of the Annual Report of this Institution for the current year:—The Report begins by stating that year by year the field of the operations of the National Life-boat Institution had extended—its life-saving fleet had been added to—and the greater in proportion to the number of wrecks on our coasts had been the number of lives that have been saved from premature death through its instrumentality. By its Charter of Incorporation the Institution was now legally entitled, by the bequests of deceased persons, to possess landed property to the extent of £2,000 per annum. Her Majesty the Queen, who since 1837 had been the patroness of the Society, had, in appreciation of the important and national character of the work of the Institution, become an annual subscriber of £50. During the past year it had established 17 new life-boats on the coast, and others were in course of construction for several other places. The Institution now possessed no less than one hundred and ten life-boats. Some of them had been directly instrumental in saving two hundred and ten lives from thirty-four vessels during the preceding year. Since the 1st of January last, the life-boats of the Society had also saved no fewer than one hundred and sixty-two persons. The Committee had taken steps to provide the life-boat stations of the Institution, wherever desirable, with standard barometers, properly fitted up, and the daily indications of which would be registered on a chart or diagram by the side of the instrument. The total number of wrecks on the coasts of the United Kingdom, during the past year, was 1,379; the average of the last seven years being 1,184, whilst the total loss of lives in 1860 was 536, the average for the last seven years being 800. The number of lives saved during the year 1860, by the life-boats of the Institution, the rocket apparatus, and other means, was 3,697. The total number of persons saved from shipwreck, from the establishment of the Institution to the end of the year 1860, either by its life-boats, or for which it had granted rewards, was 11,856. During the past year, the Institution had granted 16 silver medals, 14 votes of thanks inscribed on vellum, and the sum of £1,111 12s. 4d. in pecuniary rewards, for saving 455 shipwrecked persons. The operations of the Institution might be thus briefly stated:—Since its formation, it had expended on life-boat establishments, £46,350 8s. 3d., and had voted 82 gold and 673 silver medals for distinguished services for saving life, besides pecuniary awards, amounting together to £14,015 19s. 11d. Its medals and other honorary awards were much coveted by the coast boatmen and men of the Coast-guard service, and the amount and prompt payment of its pecuniary rewards afforded general satisfaction. Its medals were not unfrequently presented at public meetings. The total receipts during the year 1860 amounted to £14,027 11s. 2d.; of this sum no less than £2,721 had been given by philanthropic individuals to defray the cost of fourteen life-boats. Legacies had also been left to the Institution during the past year by several benevolent persons. The expenditure during the same period had been £13,085 8s. 11d., of which sum £6,834 17s. 4d. was expended on additional life-boat, carriages, boat houses, and necessary gear; and £3,056 3s. on the necessary expenses of repairs, painting, and refitting; £1,266 15s. 10d. in rewards for services to shipwrecked crews; and £1,665 6s. 2d. on coxswains' salaries, and for the quarterly practice of the boats' crews. The Institution had incurred further liabilities amounting to £4,419 for various lifeboat establishments, &c. Whilst the Committee were, happily, able to report so favourable and encouraging a state of the financial department of the Institution, they felt that, looking at the vicissitudes of the future, and the unforeseen magnitude which the operations of the Society had assumed, they must not for a moment relax their endeavours to enlist that co-operation and pecuniary assistance of all classes of their countrymen, which could alone secure the permanent efficiency of the important work which they had undertaken to superintend. They therefore appealed to the country at large to assist them to maintain, in a state of thorough efficiency, the numerous life-boat establishments of the Institution.

Home Correspondence.

THE ECONOMIC HISTORY OF PARAFFINE.

Sir,—As the production of paraffine, and the oils which accompany it, has been a manufacture familiar to me for the last dozen years, perhaps I may be allowed to make a few remarks upon the paper read upon the above subject, by Mr. Tomlinson, before your Society on the 20th March.

In the first place I think Mr. Tomlinson goes out of his way when he concludes that M. Faujas de St. Fond obtained the information from "Lord Dundonald's works, that on distilling coals he got oils, &c.;" for, in my opinion, the obtaining oils, &c., by distilling coals, was a thing well known at that time in France, at least, as I shall show, if not elsewhere, to any one acquainted with the literature then existing upon the use of coals. In confirmation of this I would first direct your attention to a book published in Paris, in 1770, in two large quarto volumes, written by M. de Genssane, a high celebrity, and, among other things, a corresponding member of the Royal Academy of Sciences. Of course his book is in French, but the title, translated into English, is as follows:—"Treatise on smelting ores by means of coals, or treatise on the construction and use of furnaces for smelting and refining metals and minerals, by means of coals, together with the mode of adapting said coals to the same purposes for which charcoal is commonly used;" and chapter 12 of the first volume is devoted to "the construction and use of a furnace" for making coke from coal. This is fully illustrated by diagrams, and attached to this furnace is an apparatus for condensing the volatile products given off in the coking of the coal. But this is not all, for at pages 280 and 281 he says, "the oils and bitumens obtained through that process (the coking) cover almost the cost of the operation." He then goes on to describe how he treats the distillate to separate the light oil from the bitumen, as he calls it; but in reality it is paraffine, as we now know, dissolved in the so called paraffine oil, and which he describes as "very fat and flowing, and equal to the best grease for lubricating carriages." In describing the light oil he says as follows: "As for this oil it differs from distilled petroleum only by

the latter being highly combustible, and by igniting all at once, whilst the oil of coals prepared in the foregoing manner, is much less so, and may be used with great advantage in lamps for country people. No other light is employed in the mines of Sultsbach."

It is very likely that Lord Dundonald knew of the process above alluded to, when he took out his patent in 1781 for distilling coals, but I do not say that Lord Dundonald took the idea of getting oils from coal by distillation from this process, for, from all I have read, it was generally known long before that, oils could be got by distilling coals in close vessels; at any rate, that it was well known at the time Lord Dundonald obtained his patent. His specification furnishes this fact, for he says, page 2, line 19, "persons who shall extract tar, &c., from pit-coal in vessels or buildings, it matters not their shape or size, whereby the coals are made to burn or ignite without flaming by a regulated admission of the external air through different apertures in the buildings, so as by their own heat to throw off the tar, oils, &c., that they contain —persons who do so without my permission are deemed to encroach upon my patent; as the only method used and known, until my new discovery, was a distillation of coal in close vessels, where the admission of the external air was prevented, and where other fuel or coals were required besides the coals contained in the close vessel, to produce the heat necessary to pervade the same, and to cause the coals contained therein to throw off the tar, oils, &c., that they contained."

Although I say Lord Dundonald, with many others, knew that oils were obtained on distilling coals, I do not say but that the success with which the process described by Genssane was attended may not have led him to think of a more simple way of getting oils, &c., and coke, for he coked the coal for a company who manufactured iron, his only remuneration for so doing being the volatile products which he afterwards rectified and sold.

Without going further into this part of the subject, I would wish to call your attention to a much more important point, and that is with reference to Reichenbach, the distinguished chemist, who first eliminated, examined, and described the properties of this beautiful substance paraffine, and gave a process for obtaining it from coal, the selfsame process as is now adopted at the present day, whether coals, schist, peat, or any such substances are distilled for paraffine or for the oils accompanying it, on the Continent or here, although Mr. Tomlinson has thought fit to say in his paper, speaking of the results of Reichenbach and a Dr. Bley (of the latter I would say nothing), "These failures as they must be called, so far as respects coal, arose from misapprehension respecting the required temperature, the manipulation of the gas house naturally suggesting a high degree of heat; and inquirers did not recur to the earlier methods of trying the effects of a comparatively low one."

Now this is not so, but quite the contrary is the case, as I think I shall clearly show any impartial person. I do not know how Mr. Tomlinson should have been led to make such a statement as the above, and can only think he could not have perused the original writings of Reichenbach, but must have his information from some biassed source. Reichenbach's results upon the dry distillation of organic bodies are conveyed to the public in five original papers which appeared in the *Neues jarbuch der Chemie und Physik*, by Schweigger-Seidel, between the years 1831 and 1833. In his first paper, in the first volume of the above book, published in 1831, page 177 *et seq.*, he gives a description of the process he followed, namely, by heating the coals in a retort, by means "of a sand bath, at a very low temperature, and gradually increased to a red heat." Reichenbach says, no naphthaline was contained in the tar after this process. At page 184 of same memoir, he says, "at high temperatures, that is, by heating the vapours to a red heat, soot and naphthaline are produced, and if any tar be heated so as to convert it into soot, naphthaline is produced." "That high temperatures produce naphthaline, none of which is in his tar, although said to be found by others in the tar which they examined." In a second memoir, published in the same volume at page 281 *et seq.*, he gives a review of the old processes of distilling coals or other like substances when paraffine is sought for in the tar, and shows the defects in such processes to consist among others, in using a high temperature in producing the tar; he also states, at page 288, that different results were obtained according to whether there was a high or a low temperature used; lastly, he purifies his crude product by means of sulphuric acid, the chemical now, I may say, universally used. If what I have already written is not enough to show that Reichenbach knew that low temperatures were everything when distilling coal for paraffine, and that he pointed it out, I have much more strong proofs, for, curiously enough, M. Dumas, the celebrated French chemist, from experiments made by M. Laurent upon tar, asserted that coal contained naphthaline already formed in it, as Mr. Laurent had always found it in the tar from coal, and that Reichenbach was wrong in saying tar of coal did not always contain napthaline. This brought a reply from Reichenbach, which appeared in several journals, and amongst others in the journal quoted above, and in the second volume for 1833, page 223 *et seq.*, throughout the whole of this memoir he calls attention to the use of low temperatures, and the disuse of high temperatures, or you get napthaline. I will only make a few quotations out of many. At page 226, after stating that he does not doubt M. Dumas found napthaline in his coal tar, and asking the question how did he get his tar, he proceeds to say, "that there is a difference between tar and tar, and that tars assume a very different chemical composition, according as they are obtained from red-hot vessels, or from vessels below that temperature, and heated only to the temperature of carbonization, and this difference directly concerns the amount of the napthaline in the highest degree, which may turn out in one case to be exceedingly great, and in another diminished to nothing. With regard to this, M. Laurent and M. Dumas do not say a word. We gather from their writings no indication as to whether the tar was purposely and purely prepared, or was from the coal tar of the ordinary gas works. If it came from the great establishments at the slaughter-houses of the Faubourg Montmartre, which I myself have seen, it then embraces all the conditions of a substance richly supplied with naphthaline." Further on, in speaking of the quantity of oil obtained on distilling tar, he says, "Such tar as is prepared at a high red heat, as in gas works, is much surcharged with pitch and soot, and yields, therefore, on distillation, scarcely a half of oil of tar;" this, he says, was the kind of tar Laurent used, and not such as he prepared for himself from coals "by careful and *scrupulous* protection from all excess of temperature above simple carbonization." These are Reichenbach's own words, and still further on he describes how the process is conducted, premising by saying, "the vessels in which the carbonization is performed should on no account attain a red heat," and concludes the description of the process as follows:—"So long as I proceeded in this manner I always obtained tar which was composed of eupione, paraffine, &c."

I do not think it will be necessary for me to make further quotations from this memoir, to substantiate what I have stated above, and to satisfy most people that to Reichenbach, and Reichenbach alone, is due the credit of pointing out to the world that coals distilled at low temperatures will yield paraffine and eupione, of which the now-called paraffine, or burning oil, is principally composed.

I am rather at a loss to know how Mr. Tomlinson, with a knowledge of the works at Antun, in France, where paraffine and burning and lubricating oils have been manufactured on a large scale as early as and since 1846, by distilling schist and paper coal, or lignite, should say as follows:—

"In the great Exhibition of 1851, Mr. Young obtained credit, and justly, for the production of paraffine in con-

siderable quantities. The former processes, although containing all that was necessary for its production, were not commercially successful. Either they do not produce the article in sufficient quantity, or at a sufficiently low cost to be profitable. Mr. Young has the great merit of first drawing public attention to the commercial value of paraffine, and of pointing out the sources from which it could be profitably extracted." Nor do I think Mr. Tomlinson was aware of the following, which is a quotation from a paper by Runge, in Erdmann and Schweigger-Seidel's Journal Fur Pracktishe Chemie, vol. i., 1834, p. 31, "On Certain Products on the Distillation of Pitcoal," when he wrote the above :—

"In the 2nd part of the 18th volume of the 'German Year-Book of Pharmacy,' published by Professor Dr. Lindes (1833), which has just reached us, we read, at page 247, an advertisement about the sale of eupione, creosote, paraffine, and naphthaline, which are prepared for sale in large quantities by Herr J. E. Simon, an apothecary in Berlin, and which, to suit the convenience of purchasers, have been furnished to two of the most respectable druggist firms there—Braumüller and Son, and Lampe, Kaffmann, and Company, from whom, consequently, these articles may also be obtained."

I am likewise of opinion that, if Mr. Tomlinson were told that Mr. Young himself, upon his oath, in a court of justice, at the latter end of last year, had been obliged to admit that, although he had been distilling the Boghead coal, or Torbanehill mineral, on a large scale since about the year 1850, or 1851, it was only within "the last two years" that he had made paraffine on a commercial scale,* I should think that he (Mr. Tomlinson) would rather doubt whether Mr. Young had not obtained somewhat too much justice in the Exhibition of 1851, when he then obtained credit "for the production of paraffine in considerable quantities."

I intended to have written upon one or two other points, but my time will not admit of my doing so now. The books I have quoted from are all in the library of the Great Seal Patent Office, along with several others upon this subject.—I am, &c.,

DUGALD CAMPBELL,
Analytical Chemist to the Brompton Hospital.

7, Quality-court, Chancery-lane,
March 27, 1361.

INTERNATIONAL EXHIBITION OF 1862.

Sir,—In my report on "Silk Manufactures" (Class 21 of the Paris Universal Exhibition of 1855) I ventured to make the suggestion contained in the following extract therefrom, with regard to future arrangements. As I presume it may still be an "open question," I think that this would appear to be a suitable time for calling attention more immediately to it, so that in the event of nothing unsound being detected in the principle itself, opportunity may be afforded for the discussion of such modifications as experience in other departments than that to which my attention was more especially confined may suggest, and such as may appear best calculated to give it full effect :—

"It may be beside the strict province of this report to venture a suggestion for the future arrangement of International Exhibitions, but it would vastly assist jurors, purchasers, and visitors generally, and be in harmony with their ostensible object, an arena for free competition, if all of a class were exposed in one locality. In the class under review, both in 1851 and 1855, silks and silk manufactures were distributed throughout all parts of the buildings, and no opportunity, therefore, was afforded for comparison of country with country, with the additional risk in obscure districts of no examination at all."

I am, &c.,
THOMAS WINKWORTH.

Gresham Club, April 9.

* See report of trial of Binney and Company, against the Clydesdale Chemical Company.

AMERICAN IMPLEMENTS.

Sir,—During the discussion on Dr. Eddy's most interesting paper, on the evening of the 3rd inst., it was stated that the Sheffield makers turned out axes, &c., as well, and of quite as good a quality as the Americans. I am sincerely glad to find that such is the case, for the following extract from the report of our Consul in Para (Brazil), in 1856 and 1857, shows that a very different state of things existed. He says:—

"It is a very remarkable fact, that, excepting the implements of this nature made by one or two Sheffield houses, the temper of the steel (if, indeed, there be any steel in them) in the tools which we receive from Great Britain, is so ill-adapted for working the hard woods of this country, that such tools are perfectly useless and unsaleable, whereas those which come from the United States are generally good.

"I have thought it worth while to draw particular attention to this fact, because the rage for what is miscalled cheapness, which has impaired this branch of manufacture, in which Great Britain has claimed, and may claim, to be pre-eminent, drew forth much remonstrance in England some time ago, in relation to the productions of other countries exhibited at Paris; and because there is a rapidly increasing demand for these commodities here, a demand which Great Britain can doubtless supply. It is to be noticed that the American tools above-mentioned are constructed of steel exported from Great Britain."

I need not notice the rubbish supplied to our soldiers and others during the Crimean war as proofs of the necessity of a reform in this direction, for most of us can find sufficient proofs of this in our own experience of the use of such articles.

Dr. Eddy seemed to think the manufacture of watches by machinery was an American practice exclusively, or nearly so. It gives me pleasure to inform him that he can see this plan carried out, in a very perfect manner, in the manufacture of a very elegant and simple watch, by Mr. Alexander Watkins, of the Strand.

I may remark, as to what is doing in France, that I saw, whilst in Paris a short time since, articles manufactured from iron purchased in England, taken across the Channel, made up, and brought back to this side, and sold at prices that we cannot touch, in spite of our machinery, &c., the workmanship of them being, I may observe, very superior.

I found the American wood implements of excellent workmanship in many places where I examined them when over there. I am, &c.,

C. F. T. Y.

London, April 5, 1861.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Medical, 8½. Mr. P. C. Price, "On Congenital Phymosis, considered as a frequent cause of irritation of the Urinary Organs of Young Children; the importance of its early recognition and removal."
United Service Inst., 8½. Lieut. Doull, R.A., "The Principles of Fortification applied to existing Arms, &c."

Tues. ...Royal Inst., 3. Prof. Owen, "On Fishes."
Civil Engineers, 8. Mr. Wm. Hall, "On the Floating Railway at the Forth and Tay Ferries."
Statistical, 8. Mr. W. L. Sargant, "On the fallacy of Mr. Warburton's argument in favour of an Indiscriminating Income Tax."
Pathological, 8.

Wed. ...London Inst., 7.
Society of Arts, 8. Mr. J. Crawford, "On Cotton Supply."

Thurs...Royal Inst., 3. Prof. Tyndall, "On Electricity."
Royal Society Club, 6.
Linnæan, 8. Mr. J. D. Macdonald, "On the circulation of the blood in *Pegea*, and on the physiology of the Pallial Sinuses of the *Brachiopoda*."
Chemical, 8. Prof. Abel, "On the application of Electricity to the explosion of gunpowder."
Royal, 8½.
Antiquaries, 8½.

Fri. ......United Service Inst., 3. Commander R. Scott, R.N., "Naval Ordnance and Maritime Defence."
Royal Inst., 8. Mr. John Ruskin, "On Tree Twigs."

Sat. ......Asiatic, 3.
Royal Inst., 3. M. Max Muller, "On the Science of Language."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, March 29th*, 1861.]

Dated 20th March, 1861.

699. G. Peacock, Regent House, Starcross, Devonshire—Imp. in anchors.
700. W. E. Gedge, 11, Wellington street, Strand—An improved fabric for covering billiard and bagatelle tables and other similar uses. (A com.)
701. N. Lloyd, Church, near Accrington, and J. G. Dale—Imp. in dyeing and printing textile materials and fabrics.
702. J. E. McDoual Litchfield-street, Soho—An improved fastening or coupling.
704. M. Henry, 84, Fleet-street—Imp. in treating yarns and threads of silk and other fibrous materials for purposes of restoring colour thereto and improving their quality and appearance, also in apparatus employed in operating on yarns and threads. (A com.)
705. M. J. F. Chappellier, Brussels—Imp. in manfacturing playing cards.
706. S. H. Scott, Rourn—Imp. in drawing instruments.

Dated 21st March, 1861.

714. T. Greenwood, Leeds, and A. Kinder, Great George-street, Westminster—Imp. in machinery for cutting or working in wood.

[*From Gazette, April 9th*, 1861.]

Dated 24th November, 1860.

2888. P. Dorgeval, Lyon, France—Imp. in machinery used in the manufacture of silk and other fabrics.

Dated 9th February, 1861.

333. C. While, Pontypridd, Glamorganshire—Improved rolling machinery for rolling iron and other metals.

Dated 27th February, 1861.

504. C. Stevens, 31, Charing Cross—Improved iron blinds. (A com.)

Dated 2nd March, 1861.

534. T. Haigh, Liverpool, and A. Robertson—Imp. in apparatus applicable for boiling, cooling, and fermenting malt liquors, part of which may be applied to other purposes.

Dated 14th March, 1861.

626. J. C. Coombe and J. Wright, 42, Bridge-street, Blackfriars—Imp. in the means of preserving stones, bricks, slates, wood, and other analogous materials from the action of atmospheric and other influences, and also in the manufacture of mortar, cement, artificial stone, and such like substances.
630. C. Gammon, Cloak-lane—Imp. in the mode of forming ventilators.

Dated 16th March, 1861.

666. C. Stevens, 31, Charing Cross—Improved agricultural implements. (A com.)
672. J. Robb, Dundee—Imp. in machinery or apparatus for treating hemp, flax, jute, and other fibrous substances requiring a similar treatment.

Dated 18th March, 1861.

675. J. Arrowsmith, Bilston, Staffordshire—New or improved machinery or apparatus for fixing the windows of railway and other carriages at any required height.
679. C. Clayton, J. Breedon, and A. Schneider, Deptford, Kent—A self-acting socket for taps, fire-plugs, and such like purposes.
681. M. Henry, 84, Fleet street—Imp. in furnaces in which combustion is carried on for obtaining gases or gaseous products to be usefully applied. (A com.)
682. J. S. Miller and T. P. Miller, Springfield Works, Dalmarnock, N.B.—Imp. in fixing colouring matter, more especially those derived from analine or other similar bases, on fibrous materials and textile fabrics.

Dated 19th March, 1861.

683. S. J. Wilkinson and G. F. L. Meakin, 14a, St. Mary Axe—Self-acting window fasteners.
689. J. A. Bolton, Campbell house, Leicester—An improved apparatus for heating Turkish baths, public and private buildings vineries, hot-houses, and cooking ovens.
661. J. Chalmers, Montreal, Canada—Imp. in constructing roadways under water.

Dated 21st March, 1861.

707. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Imp. in gas cock-stops. (A com.)
709. G. Baxter, Govan, Lanark, N.B.—Improved apparatus for propelling vessels.
711. J. Rhodes, Wakefield, Yorkshire—Imp. in means or apparatus for generating steam.
713. A. Heaven, 2, Richmond-grove, East Longsight, Manchester, and R. Smith, 24, Higher Chatham-street, Chorlton-upon-Medlock, Manchester—Imp. in embroidering machines.
715. W. Clark, 53, Chancery-lane—Imp. in apparatus for cutting and shaping metals. (A com.)

Dated 22nd March, 1861.

717. F. J. Wagon, Issy, near Paris—Imp. in the manufacture of soap.
720. T. Hindle, Blackburn—Imp. in looms for weaving.
721. W. Clark, 53, Chancery-lane—An improved method of locking the nuts on railroad rail bolts. (A com.)
723. J. Armour, Perceton Fire Clay Works, Kilmarnock, N.B.—Imp. in increasing the generation of steam in boilers.
724. E. Humphrys, Deptford—Imp. in steam engines.
725. T. Thomas, Rawtenstall, Lancashire—Certain imp. in apparatus for spinning and doubling cotton and other fibrous materials.
726. J. Graham, Warrington Junction, Lancashire—Imp. in preparing and annealing iron wire.
727. S. Jackson, Sheffield—Imp. in the manufacture of spades, shovels, and other articles of a similar nature.
729. A. Haley, Frome, Somersetshire—Imp. in power looms for weaving check patterns, and in connecting rods for power looms.
730. J. Potter, Leeds—Imp. in the construction of wire and other similar fences

Dated 23rd March, 1861.

731. J. C. Rivett, Prestolee New Mills, Farnworth, Manchester—Certain imp. in machinery for carding cotton and other fibrous materials.
735. J. H. Johnson, 47, Lincoln's Inn Fields—Improved skating chair. (A com.)
737. J. Spencer, Doncaster—Imp. in the construction of harrows.
738. T. Cardwell, London, and D. Campbell, Liverpool—Imp. in machinery for pressing or baling cotton and other substances.
739. H. Wickens, 4, Tokenhouse-yard—Imp. in shuttles for weaving.

Dated 25th March, 1861.

741. P. R. Hodge, 36, Blessington-road, Lee, Kent—An hydraulic press, which he terms his improved inverted hydraulic press for pressing of hay, straw, hops, hemp, or flax, cotton, or animal wool, animal or vegetable oils, or any other materials.
743. Sir W. G. Armstrong, Elswick Ordnance Works, Northumberland—Improved breech-loading cannon.
745. J. Brown and R. Gregson, Middleton, Lancashire—Certain imp. in self-acting mules for spinning cotton and other fibrous materials.
747. W. Bailey, Wolverhampton—Imp. in the manufacture of globes, or shades, and chimnies for lamps, gas lights, and gas burners.
749. W. Brookes, 73, Chancery-lane—Imp. in means or apparatus for measuring gas. (A com.)
751. J. Spencer, jun., and M. Spencer, Newcastle-upon-Tyne—Imp. in the manufacture of cast-steel tires.
753. J. Chatterton, Highbury, and W. Smith, Dalston—Imp. in submarine telegraph cables.

INVENTION WITH COMPLETE SPECIFICATION FILED.

774. J. C. Keen, Birmingham—An imp. or imps. in the manufacture of braces.—28th March, 1861.

PATENTS SEALED.

[*From Gazette, 9th April*, 1861.]

April 9th.

2473. F. C. Bakewell.
2476. T. Wilson.
2482. J. W. Rogers.
2483. J. A. West.
2484. R. A. Brooman.
2497. M. Deavin.
2503. G. Davies.
2552. J. Thompson, E. G. Fitton, and F. A. Fitton.
2559. W. Young.
2562. W. Grimshaw.
2567. W. Clark.
2577. J. H. Johnson.
2578. W. H. Tylor.
2583. J. Webber, jun.
2593. W. R. Taylor.
2651. W. E. Newton.
3020. A. Granger.
8. J. F. Belfeld.
132. M. A. F. Mennons.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, April 5th*, 1861.]

April 1st.

694. A. P. Dudley & N. Brough.

April 2nd.

710. J. Fowler, jun.
756. G. E. Taylor.
760. T. Greenwood, J. Batley, and J. Dockray.
762. T. Greenwood & J. Batley.
813. A. V. Newton.

April 3rd.

724. S. Fox and J. Chesterman.

[*From Gazette, April 9th*, 1861.]

5th April.

1702. W. A. Gilbee.

6th April.

735. D. Davy, W. Bentley, and J. Davy.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, April 5th*, 1861.]

April 2nd.

781. W. E. Newton.

April 3rd.

766. J. Higgin.

[*From Gazette, April 9th*, 1861.]

April 4th.

819. W. Rigby.

April 6th.

800. Julian Bernard.

Journal of the Society of Arts.

FRIDAY, APRIL 19, 1861.

INTERNATIONAL EXHIBITION OF 1862.—GUARANTEE DEED.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others who take an interest in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £374,700, have already been attached to the Deed.

GUARANTEE FUND FOR THE EXHIBITION OF 1862.

The following additions have been made since the last announcement, in the *Journal* for April 12:—

*** *The names marked with an asterisk are those of Members of the Society of Arts.*

NAME.	AMOUNT.	REPRESENTING THE OBJECTS OF THE SOCIETY—ARTS, MANUFACTURES, AND COMMERCE.
John Burgess, Mayor of Warrington	100	Arts.
Richard Hacking, Bury, Lancashire	1,000	Commerce.
Cooke, Hindley, and Law, 12, Friday-street, E.C.	1,000	Commerce.
Charles L. Collard, 16, Grosvenor-street, W.	1,000	Manufactures.
*John B. Sedgwick, 1, St. Andrew's-place, Regent's-park, N.W.	100	Arts.
*Henry Deacon, Appleton, near Warrington	100	Manufactures.
John Goodair, Mayor of Preston...	250	Arts.
T. O. Stock, 18, Austin-friars, E.C.	300	Commerce.
A. W. Bingley, Arlington-street, S.W.	100	Arts.
Webster and Horsfall, Birmingham	500	Manufactures.
Fredk. D. Phillips, 40, High Holborn, W.C...	100	Commerce.
The Mayor of Bolton	500	Commerce.
William and John Line, Daventry	100	Manufactures.
Robert Burgess, 14, 15, and 16, Opera-arcade, S.W.	100	Commerce.
W. P. Salter, Mayor of Thetford	100	Arts.
Daniel Biddle, 81, Oxford-street, W.	500	Commerce.

By Order,

P. LE NEVE FOSTER, *Secretary.*

INTERNATIONAL EXHIBITION OF 1862.

Fine Arts.

The Committee for advising the Commissioners in matters connected with the Fine Arts, met at the rooms of the Society of Arts, on Friday, the 12th inst.

There were present:—Earl Stanhope in the chair:—Earl Somers, Lord Llanover, Lord Taunton, Lord Elcho, M.P., the Lord Chief Baron, Mr. Edwin W. Field, Mr. Thomas Ashton, Mr. Tom Taylor, Sir Charles L. Eastlake, President of the Royal Academy, Mr. Frederick Tayler, President of the Old Society of Painters in Water Colours, Mr. Henry Warren, President of the New Society of Painters in Water Colours, and Mr. Le Neve Foster, Secretary,

Organization of Committees of Classes.

A meeting of the Committee appointed to advise her Majesty's Commissioners for the Exhibition of 1862, as to the organisation and selection of committees for the various classes into which the Exhibition will be divided, was held on Wednesday, the 17th inst., at the rooms of the Society of Arts. There were present the Right Hon. the Lord Mayor, M.P. (chairman), the Marquis of Hartington, M.P., Lord Stanley of Alderley, Lord Stanley, M.P., the Right Hon. W. Hutt, M.P., Mr. H. Cole, C.B., Mr. Bazley, M.P., Mr. T. F. Gibson, the Mayor of Birmingham, the Presidents of the Chambers of Commerce of Bradford, Bristol, Hull, Manchester, and the Potteries, and Mr. Edgar Bowring, Honorary Secretary to the Committee.

ARRANGEMENT OF MINERALS AND MINERAL MANUFACTURES IN THE EXHIBITION OF 1862.

The following communications have been addressed to the Secretary of the Society of Arts:—

Sir,—I beg to enclose a copy of a memorial which was yesterday forwarded to Her Majesty's Commissioners for the Great Exhibition of 1862, and shall feel much obliged if you will insert it in the *Journal*.

A personal application has been made by me to nearly

all the intended exhibitors whose names are appended to the memorial and also to many others who do not intend to exhibit, and therefore, whose names do not appear; and I can confidently state, that the feeling of this large mineral district is decidedly in favour of the arrangement advocated in the memorial, and that the manufacturers have not the slightest objection to having their contributions separated for the purpose of classification.

I may mention, that the signatures are mostly those of the principal firms, and that some of them give employment to a population of many thousands each.

I am, &c., ALEX. WILLIAMS, L.R.C.P., Edin., M.R.C.S.L., &c.

Neath, April 16th, 1861.

To Her Majesty's Commissioners for the Great Exhibition of 1862.

We, the undersigned owners of mineral property, producers of minerals, mineral manufacturers, and others, either exhibitors in the Great Exhibition of 1851, or intended exhibitors in the proposed Exhibition of 1862, beg to direct your early attention to the desirableness of preparing and publishing, as soon as possible, some digested plan, according to which the minerals and mineral manufactures in the coming Exhibition shall be arranged. We further beg respectfully to suggest that such plan should admit of the various minerals and mineral manufactures being so placed and arranged as to admit of a ready comparison of similar productions, and also of raw materials being exhibited as far as possible in direct relation with the various manufactures they are used for.

We submit that by the early publication of some plan or method of arrangement to be adopted in the building, we shall, as exhibitors, be placed in the best position for carrying out the object of the Exhibition, to exhibit progress in manufacture, and at the same time shall be best enabled to prepare and adapt the various objects we desire to exhibit.

Vivian and Sons.
M. Moggridge.
Geo. Grant Francis, a Local Commissioner in 1851 Exhibition.
The Governor and Company of Copper Miners in England, *per* Wm. Price Struve.
John Biddulph.
Townsend, Wood, and Co.
Joshua Williams and Co., Aberdylais Tin Works.
Arthur Bankart, Red Jacket Copper Works.
Griffith Lewis, Yrismedw Brick Co.
C. W. Neville, Lanelly Copper Works.
Morgan, Perkins, and Co., Colliery Owners, Llanelly.
John S. Tregonning and Co., Tin Plate Works, Llanelly.
T. Williams, Manager, Lead Works, Llanelly.
Neath Abbey Coal Co. and Self, *per* H. H. Price.
Penrose and Starbuck, Colliery Proprietors.
Smith, Morris, and Co., Vernon Tin Plate Works, Neath.
Dillwyn and Co.
Sweetland, Tuttle and Co., Briton Ferry Copper Works.
Redbrook Tin Plate Company.
R. Kyrke Penson.
The Rhos Colliery Company, and the Ynisneath Colliery Company, *per* Geo. Bush.
The Briton Ferry Iron Company, *per* R. Phillips.
The Melincrythan Co., Chemical Works, Neath.
Richard Morgan and Sons, Anthracite Coal Owners, Llanelly, Carmarthenshire.
Wm. Roper, Penclawdd and Corrway Collieries, Llanelly.
Neath Abbey Iron Co., Neath Abbey, Neath.
J. W. Young, Mineral Paint Manufacturer, Neath.
The Gadly's Iron Co., Aberdare.
David Davies, Blaengwaer Collieries.
Samuel Thomas, Squborwen Colliery.
Ebenezer Lewis, Bwllfa Colliery.
Crawshay Bailey.
The Aberdare Iron Co., Aberdare.
The Aberdare Coal Co., Aberdare.

Sir,—As the subject of arrangement at the forthcoming Exhibition is evidently attracting attention, I venture to make a few remarks on what I cannot but regard a most unfortunate impression produced by my paper and the discussion of the 15th March. In the memoir I spoke of the advantage of adopting some general plan of arrangement for the Exhibition, and suggested a special method for arranging minerals and mineral manufactures. At the close of the paper, in two or three sentences, I intimated that if a plan were adopted, there must be some one in each department to carry it out; and that the placing and arranging supposes the employment of some active competent person to superintend. It so happened that these remarks, which were not intended to mean at all more than they expressed, were construed by Mr. Cole and other speakers in the discussion, to form the essential feature of the plan; and I find myself since quoted as advising "a most unpopular scientific despotism," when I was only thinking of suggesting a mode by which the various objects might be most usefully exhibited.

As the scientific despotism is by no means likely to be adopted in our free country, and as it never entered into my mind that exhibitors were not to be allowed to place in their own way their own objects, subject to some general plan of arrangement, I venture to hope that this bugbear may not be brought forward again, but that, in discussing the question, regard may be had to the points really at issue.

The recommendations I offered were, in a few words, as follows:—*First*, That mineral manufactures should be exhibited in all cases, or as far as possible, in connection with the raw material from which they are produced, the object of this being to avoid the ill-effect of the raw materials being accumulated in one spot in too large a mass to be interesting to the public or instructive to those concerned. *Secondly*, That minerals and the mineral manufactures should be grouped on a somewhat different principle from that adopted in the last Exhibition, and on a plan more directly referring to their economic uses. *Thirdly*, That, if possible, the various foreign collections should either be worked into the general series, or at least so placed as to be readily comparable with the British series; and, *Fourthly*, That a digested plan of arrangement should be prepared, and submitted to exhibitors.

I have dwelt much more on the two first than on the third of these recommendations, and, indeed, I fully appreciate the difficulties attending a separation of collections. This point being now given up as inconsistent with the outline already published by the Commissioners, the other recommendations may perhaps meet with attention, as they have been favourably noticed by some speakers and writers on the subject, and I cannot but regret that they have been passed by without consideration by the greater number of my critics.

Not having been present at the Munich Exhibition, I cannot speak to the arrangement there adopted, but I think I may venture to say, from my own experience, that if a good, well-digested plan were really submitted, most of the exhibitors, and some at least of the Foreign Commissioners, might be induced to adopt it, and thus redeem from hopeless neglect a department that might be, and ought to be, extremely interesting.

Although the classes, as adopted in 1851, have been retained by the Commissioners with very slight alterations of detail, and none of general principle, there does not appear to me to be anything inconsistent with such plan, which will, I presume, be considered by the Committees of Classes, whose appointment is not yet announced. I state this to show that I have no intention of combating with a fore-gone conclusion, or hampering the Commissioners by raising discussion on matters already settled.

I am, &c., D. T. ANSTED.

Athenæum Club, April 15th, 1861.

CONVERSAZIONI.

The Council have arranged for two Conversazioni during the present Session; the first on Saturday, the 4th of May, at the Society's House, the card for which will admit the Member only; the second on Saturday, the 1st June, at the South Kensington Museum, the card for which will admit the Member and two ladies, or one gentleman.

Cards for both these Conversazioni have been issued this day. Any member not having received them should communicate with the Secretary.

Secretaries of Institutions in Union, who may receive applications from any of their members desirous to attend either of these Conversazioni, can have a limited number of cards placed at their disposal on application to the Secretary of the Society of Arts.

ARTISTIC COPYRIGHT.

In the House of Commons, on Monday last, the 15th inst., the Attorney-General, in moving in a committee of the whole house for leave to bring in a bill to amend the law relative to copyright in works of fine art, said:—The House will feel that at this late hour of the night it will be quite useless to anticipate the discussion which must take place on the second reading of this bill. All that will be necessary now, will be simply to obtain leave for its introduction. I shall therefore confine myself to the proposition, that some legislation of the kind is absolutely necessary. That necessity has, I believe, been for a long time admitted by this House, and by the other House of Parliament. I shall therefore ask now, simply for permission to introduce the bill, promising to make in the second reading a complete statement, both of the reasons of the bill, and of its main principles and provisions. Perhaps, however, the House will think it necessary that even now I should state a few facts, showing the necessity that exists at present for some legislative enactment for the protection of copyright in works of fine art. We are about to invite, within a few months, the artists of all nations to send their works of art to our approaching Exhibition, but although many nations have made great exertions to secure an international copyright, we have not as yet, in this country, any law which would give protection to their works, which above all others are entitled to it. This is one reason why I am most anxious to introduce this bill, without loss of time, promising fully to explain its provisions on the second reading. I feel that on the present occasion, and at this late hour, I shall best consult the wishes of the House by simply asking leave to introduce the bill.

The bill was then ordered to be brought in by the Attorney-General, Mr. Massey, Sir George C. Lewis, and the Solicitor-General, and read a first time. The second reading was fixed for the 25th inst.

THIRTEENTH ANNUAL EXHIBITION OF INVENTIONS.

The Exhibition was opened on Monday, the 1st of April, will remain open every day until further notice from 10 a.m. to 4 p.m., and is free to members and their friends. Members by ticket, or by written order, having their signature, may admit any number of persons. Members of Institutions in Union with the Society are admitted on showing their cards of membership.

A sheet of tickets has been issued to every member. Additional tickets may be had on application to the Secretary of the Society.

EIGHTEENTH ORDINARY MEETING.

Wednesday, April 17, 1861.

The Eighteenth Ordinary Meeting of the One Hundred and Seventh Session was held on Wednesday, the 17th inst., Sir James Kay Shuttleworth, Bart., in the chair.

The following gentlemen were proposed for election as members of the Society:—

Buncombe, Charles Hope	4, York-place, Mile-end, E.
Chanter, Thos. Burnard	Bideford.
Dalziel, George	9, St. George's terrace, Regent's-park, N.W.
Denham, Wm. Graham	48, Kent-street, Southwark, S.E.
Girdwood, William	Old Park, Belfast.
Ramsden, James	Abbot's Wood, Ulverstone.
Rouch, Wm. White	180, Strand, W.C.
Schneider, H. W.	17, Gracechurch-street, E.C.
Smith, Augustus	Wentworth-street, N.E.
Whetham, Charles	52, Gordon-square, W.C.; and Bridport, Dorset.

The following candidates were balloted for and duly elected members of the Society:—

Brett, John W.	2, Hanover-square, W.
Bruton, Leonard	Chamber of Commerce, Bristol.
Callow, James William	8, Park-lane, W.
Courtenay, L. Walter	Oak-house, Forest-hill, S.E.
Debenham, W., junr.	42, Wigmore-street, W.
Dennys, Haddock	3, Percy-terrace, Islington, N.
Dugdale, John	Burnley.
Fleming, John	21, Austin Friars, E.C.
Maull, Henry	Lewisham, S.E.; and 119, Piccadilly, W.
Potter, Wm. Simpson	1, Adam-street, Adelphi, W.C.
Robertson, Alexander	Highfield, Sheffield.
Room, Benjamin	36, Parliament-street, S.W.
Shaffner, Col. T. P.	42, Half Moon-street, Piccadilly, W.
Stevenson, James	Jedburgh, N.B.
Vulliamy, Lewis Llewelyn	Clapham-common, S.W.
Young, Thomas	14, Eaton-square, S.W.

The following Institution has been taken into Union since the last announcement:—

Maitland (New South Wales) School of Arts.

The Paper read was—

ON THE COTTON SUPPLY.

By John Crawfurd, F.R.S., late Governor of Singapore.

For some years back much apprehension has been entertained for the permanency of our supply of cotton, the raw material of by far the greatest of our manufactures,—of the greatest manufacture, indeed, which the world has ever known. I do not myself participate in this apprehension, being satisfied that in this, as in every other staple commodity which we receive from foreign countries,

an effectual supply will assuredly follow an effectual demand.

The herbaceous cotton plant, of numberless varieties, is an indigenous product of Hindustan and America, and has been cultivated in both far beyond the reach of history. The Greek conquerors of India, and the Spanish conquerors of Mexico and Peru, found the people of those countries clothed with it. From those countries it has spread far and wide, as far as Chili to the south of the equator, and as far, at least, as Egypt to the north of it. It thrives from the equator to 35 degrees away from it, and of all great staple articles of cultivation, maize and tobacco excepted, it has the widest geographical range. As to soil, cotton is found to flourish in many different varieties. The finest cotton of America is grown in the sandy soil bordering the sea, and the most abundant crops are produced in the rich alluvion of the plains of the Mississippi and its affluents. In India, its favourite soil is a black mould, the product of decomposed basalt. In Egypt it is grown in the mud of the Nile, and in Java in the deep rich soil of decomposed volcanic rocks.

In so far, then, as soil and climate are concerned, there is a very wide range for the production of cotton, but the question for our present consideration is the conditions under which good cotton can be most cheaply, abundantly, and steadfastly produced to meet our own great and increasing demand for it. The following may, I think, be stated, as the most indispensable conditions; a propitious climate, a suitable soil, land free from heavy imposts whether in the shape of rent or tax, a sufficient supply of labour, a skilful and enterprising husbandry, cheap and easy means of transport, with a government that amply secures life, property, and liberty.

I shall endeavour to show to what extent these conditions exist in the different countries which now supply ourselves and other manufacturing nations with cotton. An experience of nearly seventy years proves that they exist in the largest proportion in the Southern States of the American Union, and I therefore begin with them. Their present year's crop has been estimated at four millions of bales, each bale of 443 pounds weight, the value of this immense produce, the creation of a single life of man, being computed at £40,000,000. They supplied ourselves in 1859 with 8,558,673 cwts., that is close on 430,000 tons, of the value of £28,269,579. Last year the quantity had increased to close on 10,000,000 cwts. They furnished us, in fact, with 78 parts in 100 of the quantity and 81 in 100 of the value of our whole supply. This palpable fact is conclusive of the superior capacity of the countries in question, since it leaves to all other countries but 22 parts in 100 of the quantity, and no more than 19 in 100 of the value of our supply.

The auspices under which the cultivation of cotton is carried on in the Southern States of America are sufficient to account for this wonderful production. Climate, soil, natural facilities of transport, but above all a skilful husbandry and an enterprising commerce are there all auspicious. The producing countries extend from South Carolina, in the 36th degree of latitude, to Louisiana, in the 30th, within which bounds every variety of good cotton is produced, from the finest Sea-Island, worth 24d. a pound, to useful New Orleans of one-fourth that value.

The extent of land capable of growing cotton in the States in question has been computed at better than 39 millions of acres, or above 60,000 square miles, some 10,000 more than the area of England and Wales. Of this immense surface, the amount under cultivation in 1859 was computed to be only a sixth part, yet it yielded some 15,800,000 hundred weights of clean cotton. If there be any approach to correctness in this computation, that quantity can be augmented five-fold, and this without any increase of cost, since the unoccupied field is all virgin land.

But even after every acre of the wild land thus computed to be fit for the growth of cotton has been occupied with it, an improved system of agriculture will long allow of the cultivation of the plant without any material increase of cost.

According to this view several ages must elapse before all the lands of America capable of growing cotton are occupied with this plant. In this case, the cotton manufacture of England, drawing its supplies from the Southern States of America in the same proportion as it does at present, might go on increasing to five times its existing magnitude. No doubt, a time will arrive, although it must be a very remote one, when (a dense population and its inevitable concomitant, high rent, raising the cost of production) America will prove the best market for its own cotton, and exportation necessarily cease. But for practical purposes we need not speculate on a contingency so very remote.

In the meanwhile, American cotton, instead of having risen in price, has been constantly falling from its first cultivation for export. In 1793, shortly after the first considerable imports of American cotton into England, the price of Upland Georgia was about 21d. a pound, and I believe it may now be quoted at about 6d., or less than a third part of that price. Previous to the invention of the improved cotton-gin, and while the culture was confined to South Carolina and Georgia, where the plant was liable to be cut off by early and late frosts, the cost of production was necessarily high. By the improved gin, and the pushing of the cultivation into the milder climate and more fertile soil of the Gulf States, the price necessarily fell. That that extension had been a main cause of the great fall which has taken place in the bulk of American cottons, is, I think, to be inferred from the fact that no corresponding fall has taken place in Sea-island cotton, the finest sorts of which are still confined to the sea-boards of South Carolina and Georgia. Of this long-stapled, fine cotton, I may here observe that its high cost is not a matter of serious moment, seeing that its consumption is of a very limited description. Its entire produce in the United States, including an inferior article grown on the sea-board of Florida, is reckoned not to exceed 30,000 bales, which is no more than $\frac{1}{133}$rd part of the whole cotton crop of America; while of our own supply—and we are its chief consumers—it forms, even in value, not more than $\frac{1}{35}$th part of our whole supply.

The cultivation of cotton in Anglo-Saxon America is conducted with great care and skill throughout every stage, from the selection of the seed to the reaping of the crop, the freeing from the seed, the packing, and the transport to market. I shall, however, advert more in detail to this subject when I have occasion to compare the Indian with the American cultivation.

In some quarters, apprehensions have been entertained of a failure of the American cotton supply from such murrains as have of late years attacked the potato, the vine, and the silkworm. All these, however, it should be recollected, are exotics in Europe, the potato being a native of South America, the vine of Asia Minor, and the silkworm of China, whereas cotton is an indigenous plant of North America, less liable, therefore it may be supposed, to fail, being in its native climate. Cotton is unquestionably an indigenous plant of India, where it has been immemorially cultivated, without, as far as we know, having ever been attacked by any such epidemic as has attacked the exotic vine and potato.

By some parties fears have been entertained of a failure of American cotton from slave insurrection, but I think there are sufficient grounds for thinking that this is a very unlikely event. The masters are, in this case, of a superior race to the slaves; they are more numerous, in the proportion of two to one; they are armed, while the slaves are unarmed; they are in possession of power, and they are organised. The successful insurrection of the slaves of Haiti is not a precedent in point, for there the slaves were far more numerous than the masters, who in the contest were divided among themselves, whilst the struggle was carried on in a climate and locality favourable to the slaves, and fatal to the masters.

The high cost of slave labour has been urged as a probable obstacle to the progress of cotton culture, but to judge by the result, there seems no ground for this apprehension. The fact seems to be that the abundance of fertile land has more than counter-balanced the high price of labour performed by slaves, exactly as it has done in the Northern States the costly labour of freemen. Even India affords an illustration of the operation of the same principle. It is not Bengal, with its low-priced labour, that exports corn, but Arracan and Pegu, where wages are double or treble as high, but where abundance of unrented land of the highest fertility more than counterbalances them.

At the present moment a great revolution threatens to separate the Southern or cotton producing States from those of the North. That may be productive of temporary inconvenience, but I do not see how it can permanently jeopardise the production of cotton. The South lives and thrives by cotton just as much as does the north by corn, and the culture of one crop is just as indispensable as that of the other. So long, then, as we can afford to pay for cotton, we may rest certain that the Southern States of America, under whatever form of Government—and it is difficult to imagine that an Anglo-Saxon people, long disciplined to liberty, should establish a bad one—they will assuredly continue to supply us.

It is not, I think, too much to assert that the greatness of our cotton manufacture has in a large measure sprung out of the incident of our having planted colonies in North America. In the creation of that mighty manufacture we and our colonies have been, in fact, co-operating —playing, as it were, into each others hands. But for our inventions, our enterprise, and our industry, the cotton of America would never have reached the value of £40,000,000 a-year, nor, without the planted colonies, that of our manufactures reached £60,000,000. Had we depended on our West Indian possessions for our supply of the raw material—as we chiefly did in the last half of the 18th century—our manufacture would have been comparatively small, and had we trusted to the East Indies it would have been both small in amount and indifferent in quality. In the co-operation in question there is assuredly nothing to be regretted. On the contrary, it is a powerful bond for lasting peace and friendship.

After America, India furnishes us with the largest supply of raw cotton. Out of our whole supply it yields 15 parts in a 100 as to quantity, but only 11 as to value. As compared to our supply of American cotton, the proportions are about one-fith part as to quality, and one-seventh as to value. The first considerable importations of Indian cotton into England took place in 1788, about four years prior to the earliest import worth naming from America. For a quarter of a century after this the Indian trade was a close monopoly, and in this evil condition, of course, no considerable importation could reasonably have been looked for. Since 1813, however, the trade has been free, and the quantity imported has been greatly increased. The quality, however, has undergone no sensible improvement, for, from first to last, the cotton of India has stood the lowest of all that enters into our consumption. It is short and coarse in the fibre, and usually contains 25 per cent. of waste, whereas the cotton of America contains but half that quantity. The qualities of American cotton range from 6d. a pound to four times that price, or 300 per cent. American cotton is, therefore, suited to the manufacture of every kind of fabric, from the coarsest to the finest, while Indian cotton is fit only for the manufacture of inferior fabrics.

The causes of the inferiority of Indian cotton are manifold and manifest, but may generally be described as having their origin in a rude and barbarous industry. The soil and climate of India, it may at once be conceded, are in no respect inferior to those of America. The system of production in the two countries is, however, widely different, and quite sufficient to account for the inferiority of Indian cotton, both as to quantity and value. As far as my knowledge extends I will endeavour to compare, or more correctly, to contrast, the two systems.

The cultivator of American cotton is an educated, intelligent, and enterprising capitalist; he is the owner in fee simple of the land he tills, pays rent to no one, and pays no tax to the imposition of which he has not himself been a party. The Indian cultivator is an untaught peasant, the mere occupant of the land he tills, so long as he continues to pay the rent and taxes exacted of him. He is a farmer borrowing money from an usurer at 50 per cent. and mortgaging his future crop to pay the interest in kind. The farming stock of the American planter consists of powerful well-bred horses or mules, and the implements of his trade are as highly improved as those of the Lothian or Northumbrian farmer. The stock of the Indian cultivator consists, of a pair or two of ill-fed oxen, of a hoe worth a shilling, of a harrow worth two shillings, and of a plough worth perhaps as much as four. The agricultural processes of the American farmers are the improved discoveries of the last 70 years, and those of the Indian cultivators those pursued by their forefathers, without change from generation to generation—beyond the reach of history.

The culture of cotton is the most careful and skilful branch of American husbandry, unless we except that of tobacco. In India it is always one of subordinate consideration. In America the land is carefully tilled in raised beds, and the seed sown in drills, the plants being thinned out so as to leave a space of some 18 inches longitudinally between each plant, with a space of four feet between each drill for the convenience of hoeing, thinning, pruning, and weeding—all of them operations fastidiously attended to. In India, the seed is sown broadcast, and frequently along with another crop, which to the cotton proves, of course, a vigorous weed. In America, the same seed is not persevered in for above five or six consecutive years, but fresh seed is brought from remote places, even from as far as Mexico and Peru. In India, the same seed, unchanged, has been sown on the same lands time out of mind. In America, the well-nourished cotton plant rises to the height of from 6 to 8 feet, but in India to no more than one half that height. In America, the average produce of an acre of cotton freed from the seed, varies with the climate and the variety of plant cultivated. As far as I have been able to ascertain, it is in the most northern of the Southern States about 168 pounds, and in the Gulf States about 285 to the acre. With the Sea-Island cotton it is very fluctuating, being as low as 80 pounds and as high as 220, but on an average about 140 pounds. According to Dr. Royle, the aveiage yield of an acre in India is but 100 pounds.

The export of cotton from America had hardly commenced, when an ingenious and effective gin, since greatly improved, was invented for performing with speed and economy the difficult operation of freeing the wool from the seed, especially with short-stapled cotton, the chief crop. This valuable invention has produced a revolution in the history of American cotton culture, and to it must be ascribed much of the prosperity of the cotton cultivation, and consequently to that of our own manufacture, in the increase of which Whitney's saw-gin shares with the inventions of Arkwright and Hargreaves.

An ordinary American saw-gin for cleaning the black-seed or fine Sea-Island cotton, will produce, in a day's work, at least 300 pounds of clean cotton, while the puny Indian machine will hardly yield 3 pounds, or the one-hundredth part of that amount. In an interesting discussion which took place in this Society last year—after the reading of Dr. Forbes Watson's instructive paper—it was stated by an experienced observer, Mr. Brice, that it required a day's labour of 750 hard-working women to clean a ton of Indian cotton, which, of course, implies the same number of gins. Eight American gins would do a little more than this in the same time, and do it better.

Some well-meaning parties have endeavoured to introduce improved cotton gins into India, but the project is

clearly a great mistake. While the Indian gin, consisting of two vertical roller revolving in opposite directions, would hardly cost 4s., a saw-gin would cost at least £8, or more than the worth of the whole farming stock of an Indian peasant, cattle, implements, and seed, while even if possessed of it he would not have the skill to use it or mend it when out of repair. American gins, consisting of a series of saws, and capable of producing, according to their size, from 1,000 to 1,500 pounds of clean cotton a-day, will cost, exclusive of the power, cattle, or steam, which moves them, from £400 to £500, a sum which would exceed the entire agricultural capital of a populous Indian village.

After this account of the cultivation of Indian cotton, its low quality and the smallness of the supply cannot surprise us. In this, indeed, it differs in no respect from other Indian commodities produced under the same inauspicious conditions, that is produced by the rude unassisted industry of Indian peasants. I will give a few examples. The indigo of India was unfit for the markets of Europe until Europeans undertook the manufacture and introduced new processes about 7 years ago. The sugar of India, as long as its manufacture was confined to the natives, was so poor in saccharine matter as to be unmarketable out of India. It is now in the hands of Europeans, and is equal, if not indeed superior in value to the sugar of Jamaica. Indian raw silk was unfit for the manufacturers of Europe until the Italian mode of reeling and culture was introduced, and even now, still much in native hands, it is of little more than half the value of the silk of Italy, and scarcely on a level with that of China. Tobacco has been cultivated over all India for 25 years, and neither soil nor climate can be said to be adverse to the growth of this plant of wide geographical range, but the quality is so inferior that it has found its way into the markets of Europe to but a very trifling extent, and then is scarcely of half the value of American.

The stick-lac of India was a very rude article until Europeans invented the process of extracting a soluble dye from it, and now, in its improved forms, it has become a considerable article of Indian export. Flax is a plant of extensive cultivation in India, but for its seed only, for the art of preparing a textile material from its fibre, a more difficult one than that of producing cotton, has never been known to the Indians. Hemp is apparently a native product of India, and widely cultivated, but generally only for its juice, to produce intoxication. Sheep's wool is, of course, an article the production of which is entirely in native hands. We are now importing it to the yearly value of about half-a-million; but it is hardly of half the value of Cape wool, or of one-third that of Australian. I shall give one more example, for it is a very striking one, that of rice. It is a native plant of India, of immemorial cultivation; and it was only by the accident of an East Indiaman in its homeward voyage touching at Charlestown that it was introduced into Carolina about the middle of the last century. The Carolina rice, however, raised from the Bengal seed, is worth in the London market double the price of Bengal rice.

Wherever a rude husbandry and a cheap manipulation are adequate to the production of commodities suited to the Indian climate, India will be found to yield them abundantly. We have a good example of this in the article of opium, which, although the poppy be an exotic in India, is produced to the yearly value of, at least, £2,000,000, and sold to the Chinese and others for £7,000,000. We have other examples in oil-seeds, in hides and horns, and in Jute, the *Corchorus capsularis* of botanists, a native plant of Lower Bengal. Of these articles, unknown to the trade of India forty years ago, and it may almost be said the discovery of Europeans, we are now importing to the yearly value of between three and four millions, or more than double the value of all the cotton we receive from the same quarter. This is more than reversing the case with regard to America, of our whole imports from which, cotton forms 82 parts in 100.

It rarely happens that mere rude husbandry is equal to the production of any article in perfection; and in the few cases in which it is so, peculiarly favourable soils and climates will be found to be the cause. This is the case with the pepper of Malabar and Sumatra, the cinnamon of Ceylon and the fine spices of the Moluccas, but these are not great staples of trade. Coffee is a great staple, but an article of far easier production than cotton; but still, a small part of Arabia excepted, in which the culture is known to be carried on with skill, it is raised in perfection only under European care. Thus, we see the coffee of Ceylon distinguished in our market as Plantation, or that raised by Europeans, and native, or that produced by the inhabitants of the island; the first being at least 15 per cent. more valuable than the last. The same superiority exists in Java coffee, cultivated under European superintendence, and the coffee of Singapore, all the produce of native industry only, and brought to that emporium from native states. The coffee of St. Domingo, when raised by French care, was the finest in the West Indies, and now, raised by negroes, although freemen, it is excelled by the coffee of Jamaica, under English care, by 20 per cent.; which would seem to imply that African husbandry, in its most improved form, is inferior even to Hindu or Malayan.

Much has been said of the advantage which might be derived from the extension of irrigation to the cultivation of Indian cotton. Cotton, no doubt, like all other plants, requires a sufficient supply of moisture, but its husbandry is eminently a dry field or upland culture, as much so as that of wheat and barley. No plant, indeed, demands less water than cotton. It is not in this respect like the grasses of European meadows, the production of which can readily be doubled by a copious irrigation judiciously applied, and still less does it resemble rice, the great agricultural staple of the tropical and subtropical parts of Asia, the produce of which, by a copious irrigation, can be multiplied even as much as five-fold. Wherever, then, in India there exists an abundant supply of water from periodical rains, or a perennial supply from artificial irrigation, rice will be the chief object of culture, and cotton, pulses, and other plants, merely subsidiary crops. Even in latitudes in which rice is not the chief object of cultivation, cotton does not seem to have any peculiar claim to irrigated land over other crops, for their several advantages can only be determined by the fluctuating prices of the market.

Not only, indeed, is a copious irrigation not necessary to the growth of cotton, it is even destructive to it. "Dryness," says Bryan Edwards, himself an eminent planter in Jamaica, "both with respect to soil and atmosphere, is indeed essentially necessary in all the stages of the growth of cotton, for if the land is moist, the plant extends its leaves and branches, and if the rains are heavy, either when the plant is in blossom, or when the pods are beginning to unfold, the crop is lost."

But there is a cause which enhances the cost of raising cotton, as it does of all other products of the soil in active operation in many parts of India. This has been already adverted to, but demands some further explanation. This is rent, whether paid under that name to the landlord or to the state as tax, or to both conjointly, as is the case throughout India. Its operation, as is now well understood, amounts to this, that it reduces the productive power of all the more fertile lands to the level of the lowest under tillage, that is, diminishes to the lowest standard the productive capacity of the main instrument, the soil, by which the productions of the earth are raised. In some of the most populous parts of India, equally as in England, this principle is in active operation, and hence it is proportionally as costly to raise rice and cotton in these as in England to raise wheat and hemp.

Even in very populous countries, however, there are conditions in which the principle of rent may not operate in the manner I have now ascribed to it. This will be the case when there is much land unoccupied, unfit for the

growth of the staples of food and clothing, but still well adapted to the growth of other valuable articles. China is a case in point; all its fertile lands have been long occupied in the production of corn, cotton, and similar staples. Within the last century its population has been at least doubled, and hence there has been a great increase in the price of all the productions of the more fertile lands. But tea is grown on hill-sides, not adapted to the growth of such staples, and, although there has been a vast increase in its production within the time referred to, there has been no appreciable increase in price, because land sufficiently good for it is still abundant. Rice and cotton, therefore, are imported into China, while tea is exported from it.

Java furnishes another example. It contains above eleven millions of inhabitants, or about 300 to every square mile, and its best lands bear heavy rents. But it has much mountain land, which, although unfit to yield corn and cotton, are well adapted to coffee, which is extensively cultivated. Owing to this state of things, while it is one of the largest exporters of coffee, it exports very little rice, the price of which has sustained a great increase within the last forty years.

Our old provinces of the lower valley of the Ganges are the most fertile parts of India, and just as capable of growing cotton as the valley of the Mississippi. In fact they do grow it largely, but they have a density of population ranging from 300 inhabitants to a square mile up to 800. They not only, therefore, export no cotton, but, on the contrary, import it, just as we ourselves do flax and hemp. They have, indeed, for the same cause, nearly ceased to export rice, for most of what goes under the name of "Bengal" is now, as already stated, the produce of the fertile but under-peopled countries of Arracan and Pegu, which have spare populations, ranging from 9 to 50 to the square mile. The fertile alluvial tract which lies between the Ganges and Jumna, was once a large exporting country of cotton, but now with a population ranging from 350 to 550 inhabitants to the square mile, it has in a great measure ceased to be so, consuming its own produce, independent of what it receives from ourselves in the shape of manufactures.

The really cotton producing districts of India for exportation are all under-peopled, in this respect more resembling new colonies than old countries. The largest cotton-exporting country of India is Gujurat, and its average population to the square mile is 150. Candeish, another exporting province of the Bombay Government, has only 65 to the square mile. Berar, in the centre of India, and which supplies with cotton both Bombay and Calcutta, has a population which ranges only from 44 to 78, and even Bundelcund, the most productive cotton country near the valley of the Ganges has no more than 197. Certain provinces of the government of Madras, extending from the 8th to the 16th degree of latitude, are well adapted to the production of cotton,—export some, and might export much more did Madras possess the good roads, water communication, and safe harbours, which it eminently wants. The average rate of population of these provinces is about 144 to the square mile.

All India may be said to produce cotton, but the parts that produce more than they themselves consume, although a large surface, form but a small fraction of the vast area of that great region. All the most improved and populous portions are, in fact, importers from the less cultivated and less populous ones. This import had been in progress long before our connexion with the country.

But, besides the demand of the populous parts of India on the exporting districts, China becomes a competitor with them and ourselves in the Indian market, the quantity yearly exported to it being about one-fourth part of what is supplied to ourselves. The consumption of the article, on account of its bulk, is understood to be limited to two or three of the sea-board provinces of the empire.

Independent of the disadvantages of a rude husbandry, India has to struggle against all the difficulties of a barbarous and distant conveyance. In a word, the lowest quality of cotton has to be brought to market by the worst roads, the rudest means of transport, and the greatest distances. India has no good roads connecting the producing districts with the ports of export. It has no navigable canals for that purpose, and in so far as cotton is concerned, hardly any navigable rivers. The cotton of Candeish (and this is rather a favourable case) has to be conveyed by rude carts for 180 miles to the first seaport, from which it has to be shipped to Bombay, and there re-shipped for England.

The cotton of Berar—a country in the centre of India —has to be conveyed by land a journey of 400 miles to Bombay, or by 400 miles of land and 500 of river transport to Calcutta. There is no road for wheel-carriage in either case, and the cotton is conveyed on bullocks' backs. Every day, in a journey of at least forty days, the bullocks are loaded and unloaded, the bales being left at each resting place on the naked earth, exposed to the sun and rain.

The facility, cheapness, and speed, which the American cotton States, and more especially those of the Gulf of Mexico, possess in the matter of transport, make but a contrast to the rude means of India. Even when there is a necessity in America for having recourse to land carriage, instead of the backs of oxen, we find well covered and convenient waggons.

Over the extensive coast of India we have not above three convenient ports of export, while within the more limited coast of the American cotton States there are not less than thrice that number. Besides this, from the American ports to the European marts the sea voyage is certainly not above one-fourth part the length of that from the nearest part of India.

The benefits to be derived from Indian railways have been much insisted on, and I have no doubt they will increase the supply of cotton, and materially ameliorate its quality by bringing it in a cleaner state to market. Experience, however, has sufficiently proved that for the conveyance of cotton, or any other bulky commodity, railways cannot compete with navigable canals, and still less with great rivers, admitting at all seasons of the navigation of heavy steamers. But whatever benefit may be derived from railways, it is evident that China, and the cotton consuming provinces of India itself, will, equally with England, participate in it, and that consequently our relative position to these competitors will remain the same as now.

As there is assuredly nothing in the soils and climates of India inimical to the production of good cotton, what is really wanted to insure it is skill, care and capital, and we know, from our experience of other commodities, that these have never been applied except by intelligent and enterprising Europeans. Europeans have applied themselves successfully to the production of silk, sugar, indigo, and lac-dye, but not to that of cotton, which is in the same rude condition that all these articles would certainly still have been in had they not engaged the attention of Europeans. The reason why cotton has not, like them, attracted European attention appears to me very obvious. It is nearly as much a mere product of agriculture as corns or pulses, whereas the productions in which Europeans have engaged partake at least as much of manufacturing as of agricultural industry, affording means for the exercise of skill and concentrated care and attention, impracticable in the processes of mere husbandry. Even, indeed, in respect to the commodities which have received decided improvement, it should be noticed that this is chiefly confined to the processes of manufacture. For the indigo plant, the sugar-cane, the palm yielding sugar, and the mulberry, the raw materials are still chiefly cultivated by natives, and according to the immemorial and barbarous rules of Hindu husbandry.

But, independent of the fact that the attention of Europeans is naturally confined to the production of the most profitable articles, or those in which their superiority

over the natives chiefly lies, the existing state of society in India is eminently unfavourable to their engaging in any purely agricultural pursuit, owing to the imperfect administration of justice, the notoriously bad administration of police, the complexity of titles to land, and native roguery.

In the districts in which cotton would be most advantageously grown, an European could not become a proprietor of land at all, for the plain reason that there is no land to buy, high and fluctuating taxation having deprived it of saleable value. Even if in possession of it, he would still be, like the native cultivator, the mere occupant of the land he tilled so long as he continued to pay the contributions exacted of him. In the cotton districts, therefore, there are no European settlers, nor is it at all likely that there should be in the present state of Indian government. The European settler, to enable him to grow good cotton, must possess the fee-simple of the land he cultivates—must be protected by good laws, and liable only to moderate and fixed taxation. Until these conditions are realised, we must despair of improving the quality of Indian cotton.

Our importation of cotton from all other countries than India and the United States is very inconsiderable, not exceeding 7 parts in a 100 of our whole supply. Our largest importation is from Egypt, but it forms but a fraction of $\frac{1}{32}$ part of our supply. Cotton was unknown to the ancient Egyptians, and its culture was most probably first made known to them by their Arabian conquerors in the 7th century. Its culture for exportation is a very recent affair, dating only from the year 1821, when Europeans introduced American seed and the American husbandry. This improved cotton culture, then, has had a trial of 40 years, and its produce has increased but in a small degree. In the nine years from 1850 to 1858, the increase in the production of Egyptian cotton was about 11 per cent.; in American it was 46 per cent., or above four times as great.

In 1849, the quantity which we ourselves imported from Egypt was 155,132 cwts., and in 1859, it was 336,313 cwts., being the largest supply which it ever yielded. Ten years, then, added to our supply, no more than a poor 181,181 cwts. If all Egypt watered by the Nile were under cotton culture, and no other part of the country is fit for it, its produce would be far from sufficient to meet our demands. That, however, is an impossible case, for the fertile land in Egypt is equally well fitted for the growth of other agricultural products as it is for cotton, a sufficient proof of which is that it not only feeds its own population, but furnishes ourselves with various corns to the yearly value of a million sterling.

Our next largest supply comes from Brazil, a region extensive, fertile and genial, and which, were its industry Anglo-Saxon instead of Portugese, would, no doubt, furnish us with a large supply of good cotton. It does not do so. In 1849, our import from it was 274,893 cwts., and has never reached that amount in the ten years which had elapsed to 1859, when the quantity was no more than 200,705 cwts. That the soil and climate of Brazil are favourable, and the agricultural skill considerable, is to be inferred from the fact that the average value of all Brazilian cotton is by 13 per cent. better than the average value of all American, and full 60 per cent. better than that of all Indian cotton. I take these proportions from the valuations of the brokers employed by the Board of Trade.

The culture of cotton in Brazil, as indeed in all countries except the Gulf States of America, is but a concomitant crop with other staples, and this is sufficiently evident from the character of our own importations from it, for I find that whereas in 1859 our import of cotton from it was only of the value of £744,020, our imports of sugar and coffee reached the value of £2,788,536, or above three times as much.

The cultivation of cotton in Brazil, as in several other places, has been superseded by sugar in the plains and coffee in the hills. Brazil, in fact, could not compete with America in cotton, but it could easily beat America in sugar, and it naturally selected the latter as the principal object of its husbandry.

A very insignificant quantity of cotton has of late years been imported from Chili and Peru. The largest import from Chili was in 1856, when it amounted to 4,393 cwts., and since then it seems to have ceased altogether. The largest import from Peru was also in 1856. In 1858 it amounted only to 2,484 cwts., while in 1859 it was 180 cwts. less than this. From Chili and Peru, then, we can entertain no hope of any material supply. The industry of these two countries takes a direction very different from that of mere husbandry, as must be obvious from the fact that, on the average of the five years ending with 1859, they furnished us with cotton to the value of little more than £11,000 a-year, while our imports from them of wool, minerals, and other products, averaged £5,400,000. The cotton of these countries is, indeed, chiefly worth notice as affording proof of the variety of climate and locality in which fine cotton can be produced; for, to judge by the valuation of the public returns, the cotton of both countries is of a very superior quality; that of Peru, indeed, the very finest in the English market, being full 40 per cent, more valuable than the average of American cottons.

In all the countries between Bengal and China, and in all the considerable islands of the Malayan and Philippine Archipelagos, the cotton plant has been immemorially an object of cultivation; indeed, after corn, the chief object of their husbandry. It is of many varieties, depending more on soil and climate than modes of culture; but everywhere it is a coarse, inferior article, usually below even that of India. Small quantities have been exported from such countries as Siam and the Philippines to China, but generally their whole produce is consumed in the place of production. In Java, for example, eleven millions of people have to be, for the most part, clothed with it, and, therefore, exportation is scarcely more possible there than it is from Bengal within the tract inundated by the Ganges. From the great increase, indeed, which has of late years taken place in its population, and the arbitrary diversion of its industry to what go under the name of Colonial productions, this fine island has, as already mentioned, in a good measure ceased to be what it once was, a great exporter of corn.

As to China, which some parties have idly enough indicated as a source of cotton supply, it is sufficient to say, that ever since we have known it, it has been an importer of cotton as it has been of corn, usually receiving from our own Indian territories of the first of these articles to the annual value of from two to three millions.

Our West Indian Colonies, Insular and Continental, which seventy years ago furnished us with our chief supply of cotton, supply us at present with but comparatively a very trifling one. In 1847, the quantity was between eleven and twelve thousand hundred-weights, and in 1859 it had fallen to less than one-half this quantity. In the last-named year, the same colonies supplied us with the various productions of the sugar-cane to the value of more than nine millions sterling. The cane, in fact, being more congenial to the soil, climate, and industry of these tropical colonies, has superseded cotton, and there seems no probability of the culture of the latter being revived. Bryan Edwards himself, as already mentioned, a planter of Jamaica, our most fertile and finest island, expressly tells us in his "History of the West Indies," that "of all the productions to which labour is there applied, the cotton plant is, perhaps, the most precarious. In its first stage it is attacked by the grub; it is devoured by caterpillars in the second; it is sometimes withered in the blast, and rains frequently destroy it, both in the blossom and the pod."

There seems nothing to blame in the West Indian mode of cultivation, which, although less skilful than that practised in America, is essentially the same, and indeed the

latter was probably borrowed from it. The main difference was in the gin, which, instead of the effective and powerful American one, was a small instrument, a considerable improvement on the Indian, consisting of two parallel rollers moving in opposite directions, set in motion by the foot, and costing from two to three pounds.

The unsuitableness of the West India Islands generally for the production of cotton is attested by its supercession in the foreign colonies by the sugar-cane in the same way it has done in our own. Thus, the fine islands of Cuba and Porto Rico are said to furnish Spain with no more than three thousand hundred-weights of cotton. They furnish ourselves with none at all, while we imported sugar from them in 1859 to the value of near £5,300,000. The only foreign West Indian colony which supplies us with cotton at all is the Danish one of St. Thomas, but the quantity is small, short of ten thousand hundred weights, and I only mention it on account of the excellent quality of the article, which is equal to the Peruvian, and superior to the average of the American by full 40 per cent.

St. Domingo, which as a French colony furnished France with its chief supply of cotton, produces at present, I believe, none at all. It does not even produce sugar, in which, as a colony, it was so prolific. But it produces coffee, the lowest in quality known in the European markets, an article, as already mentioned, of far easier growth than cotton or sugar. Had the island continued an European colony, it is probable that its cotton would have been beaten out of the market by that of America, and been superseded by the cane. Its present state, then, is ascribable to its having possessed an African Government, that is a rude Government, for above half a century.

Turkey was the country which alone furnished us with cotton when our manufacture was confined to fustians, and it still supplies us with a trifle; in 1859, for example, with 3,551 cwts., of the value of £11,313 of a fair quality, for it was full 18 per cent. more valuable than Indian. I mention Turkish cotton only because I have lately seen in the newspapers the prospectus of a scheme for obtaining a supply of it through a new Association, to be called "The Cotton Bank of Anatolia." But assuredly anarchical Turkey—and more especially the most disorderly portion of it, the Asiatic, the only one fit to grow cotton—is not the country in which rational Europeans will invest their capital in the production of cotton, and unless they do, the unaided Asiatic tribes are just as incapable of furnishing an ample supply of good cotton as are the Hindus unless assisted by the British Government.

Like India, Turkey is capable of yielding commodities for commercial exchange of rude production, but not those demanding careful husbandry and skilful manipulation. The kind of commodities which the rough industry of the Turks is capable of supplying may be judged of by our own importations, taking the year 1859 for an example. Some of them are almost spontaneous products of the earth or water, as sponge, galls, and valonia, with which Turkey furnished us to the value of £560,000. Goat's wool is another article which owes very little to art, and with this it supplied us to the value of more than £340,000. Other commodities it owes far more to climate than to industry, such as figs, raisins, madder, and opium, which we received from it to the value of £850,000. Of maize, the most easily produced of all the cereals, Turkey and its dependencies provided us with our largest supply of which the value exceeded a million. The case of Turkey, then, is a close parallel to that of India.

Africa has been indicated as a quarter from whence an ample supply of good cotton might be obtained; and, in so far as mere soil and climate are concerned, it is impossible that a region which, as far as the mere growth of this article is concerned, embraces 32 degrees on each side of the Equator, should not possess many suitable localities. It is grown in the colony of Natal, from which, on the average of the three years ending with 1859, we imported between eleven and twelve thousand hundred-weights, of the value of better than £32,000, of a quality, however, inferior to American by a pound sterling a hundred weight. Even here, however, the culture is giving way to that of the cane.

But it is tropical Africa inhabited by rude negro tribes, and not extra-tropical colonised by British subjects, which has been of late so much insisted on as a source of cotton supply. When I look to the history of cotton, I feel obliged to pronounce all hope of such a supply as utterly delusory. Suitable soil and climate no doubt exist in abundance, but every other element necessary to the successful and effectual production of supply are absolutely wanting. Experience has taught us that skill and capital are indispensable to the production of cotton for our purpose, and these cannot live except where there is perfect security of life and property, a condition which has never existed, and does not now exist, under any negro government. Europeans will assuredly never invest their skill and capital in tropical Africa under a negro government, and Africans without them are as incapable of furnishing good cotton as they are of manufacturing fine cutlery or correct time-keepers. The Hindus, a comparatively civilised people, have been growing cotton for ages and are yet incapable of producing an article that can compete with the produce of civilised industry. What reasonable hope then can be entertained that the negroes of Africa, so far below Hindus, should be able to achieve what Hindus have utterly failed to accomplish?

Cotton is found to be grown all over tropical Africa, and is by some pronounced to be an indigenous plant. I believe it to be an exotic, or the ancient Egyptians, the most civilized of all African people, would have known it, which it is well understood they did not. Even, however, if it were indigenous and grew freely and almost without cultivation, that would in no respect affect the question of the capacity of Africa to furnish us with such a supply as would make us independent of America. Cotton fit for the coarse fabrics of the inhabitants may be, and no doubt is, grown in sufficient abundance, but to say that an article fit for our use can be produced in tropical Africa, seems to me no more reasonable than it would be to insist that every country in which the vine grows freely is capable of producing the wines of France and Spain.

I find that cotton was imported by us, for the first time, from the West Coast of Africa, in 1858, when the quantity amounted to 2,116 cwt. This cotton, I believe, resulted from the exertions of a benevolent and enterprising English merchant, an isolated example, not, I should think, very likely to be imitated. I greatly respect and honour the exertions of Mr. Clegg, although I may think them misapplied.

Of late, the eastern side of Africa has been spoken of, in my opinion, most idly, as a probable source of that cotton supply which the western has failed to yield. The inferiority of the eastern compared with the western coast, appears to me most conspicuous, judging by the descriptions given of it by recent travellers. It wants the great navigable rivers of the western side, and hence wants its rich alluvial lands. Its inhabitants are more rude and fewer in number than those of the west, and the country is at least twice as far away from the consumer, and this, too, by a more difficult navigation.

We are told that the eastern side of Africa produces cotton of more than one variety. No doubt it does, or it would be a singular exception to all the tropical countries in the old world with which we are acquainted, every one of which produces cotton of several varieties. But this fact is very remote, indeed, from a capacity to produce cotton for our manufacture.

That very enterprising and successful traveller Dr. Livingstone has indicated a particular locality of the eastern side of Africa as eminently suited to the production of cotton. This is a plateau near the River Shere, a tributary of the Zambesi, and not above 150 miles distant from the coast. His own account is, however, ample

evidence of its incapacity. The inhabitants are few, rude, and anarchical, the River Shere has 30 miles of cataracts, and the Zambesi is navigable only for boats in its upper course, while its lower is infested by malaria. A cotton supply, then, from tropical eastern side of Africa is a day-dream, in my opinion, never likely to become a reality.

The natives of tropical Africa, although it be wholly beyond their capacity to produce a supply of cotton to meet our wants, have shown that they are quite equal to the production of crude commodities compatible with the rude condition of their knowledge and industry. In this respect, although at a wide distance, they are in a similar condition with the people of India as compared with Europeans. The most remarkable of the crude commodities which they produce is palm oil, the produce of a native palm of the western side of the continent, and of which we ourselves are now importing yearly to the amount of some 35,000 tons, of the value of full £1,500,000. This humble palm, which the botanists have named *Elais Guiniensis*, has contributed more to the suppression of slavery than the blockading squadrons of France and England, and, indeed, grown into a formidable rival to Clarkson and Wilberforce. From the same side of the continent we import such coarse and hardy commodities as the ground-pea for its oil, capscium and ginger, but not one article implying skill in husbandry or preparation. From the eastern side, the sole product of the soil which we import consists of a few cloves of inferior quality raised in the island of Zanzibar. The commercial resources of this part of Africa have yet to be developed,—indeed, for that matter, to be discovered.

The French have of late been attempting to grow cotton in Algeria, a country lying within the same parallels of latitude as the cotton states of America, and where consequently, success might have been looked for. The project, however, has totally failed, even when bolstered by by the handsome prizes held out by the Government.

But of all the schemes for obtaining a supply of cotton, the most wild and thoughtless is that of hoping for one from the Feejee Islands, one of the most remote portions of the globe from us. These islands are but mere specks in the broad Pacific, and two of them only of any considerable size, the rest being, for the most part, uninhabited and uninhabitable rocks. Taking the whole group, however, its area amounts to no more than 1,730 square miles, or 1,107,200 acres. If, then, the whole group was fit to grow cotton, and its whole surface from year to year, without rest or fallow, covered with cotton, each acre yielding as much as the alluvial soils of the Mississippi, or 285 pounds, the whole produce of the Feejees would amount to no more than 2,826,357 cwts., or only between one-fourth and one-fifth of our last year's supply.

But any such supply is impossible, for the group is eminently mountainous, and mountain tops and mountain acclivities are unfit for the growth of cotton. Fertile plains and valleys only are so, and if these amount to a tithe of the surface of the islands, it is a large allowance, and far more than the proportion of the area of Britain fit to grow wheat. This area would reduce our cotton from the Feejees to 282,635 cwts., or little more than one forty-fourth part of last year's cotton supply. Even that much, however, would be beyond all hope, for a large portion of the fertile land must, of necessity, be appropriated to the production of the food of the inhabitants, who have been computed to number from 130 to 150 thousand.

Samples of very good cotton are said to have been produced from the Feejees, and I have no doubt of it. The wonder, indeed, would be that any country should be found within 25 degrees of the Equator that would not, with a little care, produce a sample of good cotton. That is, however, quite beside the real question at issue, the capacity of a country to produce such a quantity of good cotton as would contribute to make us independent of America; and in this sense the Feejees must with reason be considered a deplorable and indeed a ridiculous failure.

There are, as far as my information extends, but two countries that are likely to furnish us with a fair supply of good cotton, and this not in substitution of the cotton of America, but as considerable auxiliaries to it. These are our recently acquired territories on the eastern side of the Bay of Bengal, including Arracan, Pegu, and Martaban, but excluding those on the Tennaserim coast, and the lately formed colony of Queensland in Australia. I shall describe the little I know of them.

Our territories on the eastern cost of the Bay of Bengal embrace four degrees of latitude extending from the 16th to the 20th degree, and contain an area of 64,450 square miles, or are larger than England and Wales by at least 10,000 miles. Their scanty population ranges from 8 to 50 inhabitants to a square mile, or on an average about 26, not one twentieth part of the average density of the population of lower Bengal. The country is watered by one great river and three considerable ones, each with branches and affluents, forming an extensive network of internal boat navigation, so that the territory, on a minor scale, bears no inconsiderable resemblance to that of the Lower Mississippi. The coast has at least four safe harbours to which there is inland communication by water. The greater portion of the country is a rich alluvial plain, producing, as before stated, by far the largest amount of the rice which is exported from British India under the name of "Bengal," a commodity of which we ourselves imported in 1859, about 64,000 tons, of the value of £686,000, forming 88 parts in a 100 of all of that grain which we imported.

The wild or unoccupied land must, of course, from the sparseness of the population, be large, and there ought to be no more difficulty in obtaining the fee-simple of it by Englishmen, than there is in Canada or Australia. This would be a necessary preliminary to the production of good cotton. If the local population—a very docile one —were not found sufficient for the requisite labour, the exuberant population of India is close at hand to make up the deficiency. The periodical rains of great severity, extend from April to September, and during their continuance, the cultivation of cotton could not be carried on. Sown in March, however, the crop would have six months of dry weather to ripen, which, it may be presumed, would suffice. A rice crop, in this case, would occupy the land during the rains, so that there would be a cereal and a cotton crop within the year. I resided for some time in the country I am now giving an outline of, and the impression which my acquantance with it has left is, that it seems better adapted to the culture of the cotton plant than any other part of India. Experience alone, however, must be the only test of its practical adaptation.

Of Queensland we know, as yet, far too little to enable us to speak confidently of its capacity to produce cotton. It is described, however, as having a fertile soil with sufficient moisture, and to possess some commodious harbours. It certainly lies within latitudes (that is from the 30th degree south to the tropic), corresponding with those parts of Brazil which produce cotton superior to the average of American. Should Queensland be found adapted to the cultivation of cotton, the heat of the climate will necessitate Asiatic labour, and this may be obtained from India, as in the case of Ceylon and the Mauritius, or from China, equally ready to yield it, and indeed, yielding it already largely to Australia in the case of the gold mines.

From the facts which I have adduced in the course of this paper, I must come to the conclusion that there exists no reasonable ground for apprehending any serious deficiency in our supply of cotton, although in cotton, as in every other product of the soil, fluctuations must be expected which no care can obviate. Our chief reliance, must long, in my opinion, be on Anglo-Saxon America, which at present furnishes us with four-fifths of the value of all that we consume. This mere name, however, does not imply that we receive the whole from a single country, for no fewer than seven sovereign states, each as large as an European kingdom, contribute to our supply

—all, too, competing with one another to make that supply as cheap, good, and abundant as possible.

The integrity of the cotton manufacture is indispensable to our prosperity, but the cultivation of the plant is, if possible, of still more vital importance to the Southern States of America. We derive our chief supply from them, and we are by far their best customers. There exists between us, consequently, a mutual and profitable dependence, which promises a long duration. If other countries can supply us with better cotton than America, our market, the best in the world, is free to them, and no doubt they will furnish it, but it does not appear to me that we are called upon to make extraordinary or eccentric efforts to insure it, any more than we are to insure a supply of corn or any other staple article of our consumption. In a struggle of seventy years, the Southern States of America have, in a great measure, succeeded in driving all other competitors out of the market, leaving to the rest of the producing countries but a small fraction of our consumption. To save themselves from their overpowering competitors, the tropical countries have betaken themselves to the culture of the sugar-cane and coffee, in the production of which they have the same advantage over the Southern States of America that these have over them in the culture of cotton.

DISCUSSION.

The Chairman said it was now his duty to invite discussion upon Mr. Crawfurd's paper, and if the challenge which that gentleman had so gallantly thrown out was taken up with equal gallantry, he fancied the discussion would not lack interest, because the author had challenged many of the received opinions of those who had large stakes in the cotton trade of this country.

Dr. Riddell referred to the great antiquity of the cotton cultivation in India, and submitted whether any occasion existed for sending out persons from this country to teach the inhabitants the proper mode of culture of a plant the produce of which they had brought to greater perfection by their own particular plan of manipulation than had been attained in this country with its highly perfected machinery and varied means of manufacture. He ridiculed the idea of sending out complicated machinery, such as the saw cotton gin of America, to be used by the untutored Hindoo, who, even if a machine of the most simple construction became out of order, would be totally unable to repair it. He next referred to the characters of soil and climate most favourable to the cultivation of cotton of such a quality as would meet with a sale amongst the manufacturers of Manchester, and contended that India was able to produce good cotton capable of being worked up in Manchester, if they had the proper machinery to work it; but at present they had not got it. They had only got machinery suitable for certain kinds of cotton, and therefore the great bulk of Indian cotton which had been brought into this country was again exported, if the manufacturers had a good supply of the American commodity in the market. He submitted that action should be taken in this country—not in sending out persons to teach the Hindoos how to manage the cultivation of cotton, but to convince the ryots that it was really to their interest to cultivate it, and to show them that they could do so with the certainty of a fair rate of remuneration for their production. If that were done he would answer for it they would be able to obtain very large supplies of useful cotton from India.

Dr. Forbes Watson said the paper, to which he had listened with great interest, was unquestionably one of considerable importance. The chief characteristic of the paper was, that it was opposed to most of the views which had been entertained for a long time past in this country on the subject of cotton supply, and the first portion of the paper had been devoted to a review of the produce of the United States, tending to show that they must not hope for any great supplies of that article from other quarters of the globe, but that we must continue to be mainly dependent upon America. A good deal might be said at the present time to prove that we ought to feel a little uncomfortable in contemplating this complete dependence upon the United States for the staple. But it seemed to him that public opinion had at length settled this question. They knew how difficult it was to move public opinion, but when once it was set in motion it would go on, and no paper read here, after the wheel had began to revolve, would have the effect of stopping those efforts which were about to be made to get a supply of cotton from other countries. There were two remarks in the paper, however, with which he agreed; one was, that an effectual demand would immediately produce an effectual supply; the other was, that they wanted no "eccentric efforts" to procure a supply of cotton. He quite agreed with these sentiments, but taken in connection with the context, seeing that Mr. Crawfurd had pointed out certain things, with regard to the impossibility of getting a supply of cotton from other countries—seeing it was assumed, that the efforts about to be made by Manchester and by the government, added to the philanthropic efforts of individuals, seemed to be characterised as "eccentric" efforts, he (Dr. Forbes Watson) could not agree as to the applicability of the term. One remark of Mr. Crawfurd's seemed to be the key to all the mistakes which he thought had been committed in the paper. With regard to Africa, Mr. Crawfurd had remarked—"Cotton fit for the coarse fabrics of the inhabitants may be, and no doubt is, grown in sufficient abundance, but to say that an article fit for our use can be produced in tropical Africa, seems to me no more reasonable than it would be to insist that every country in which the vine grows freely is capable of producing the wines of France and Spain." Now he thought one inquiry to be made was whether that country was producing the kind of cotton which suits the Manchester market. It was the fact that not only African cotton, but Indian cotton also, was admirably adapted for our purposes. The very description of cotton alluded to in the paper was declared to be worth sixpence per pound, which was equal to the price of New Orleans cotton, and an examination of the African cotton showed that in point of length of staple and fineness it was equal to New Orleans cotton. With regard to the capabilities of India as a cotton producing country, he would not follow one by one the arguments that had been brought forward that evening. The whole thing rested upon this—Was India capable of supplying us with good cotton, and producing sufficient profit to the cultivator, at 4d. per lb.? That was the practical question, which involved that of the cost of production, and every evidence went to show that India could furnish cotton at from 1d. to 1½d. and 2d. per lb., and afford a profit to the cultivator. If that were the case, and seeing that in contradistinction to this, American cotton could not be grown at a profit, at even 3½d. per lb., it followed that the country which could grow cotton at 1½d. per lb. would in the end—if they could get the required quantity to supply our wants—send slave produce below the paying point. Mr. Crawfurd had attempted to found an argument on an alleged fall in the price of American cotton. What was the fact? The price of American cotton fell to 4⅝d. per lb. for three or four years, but since then it had been upon the rise; and since the year 1846, they had paid no less than £82,000,000 sterling over and above what it would have cost had the price remained at the figure mentioned. That was what they paid for slavery. The high cost of slave labour had been alluded to, and in that was involved the cost of production, to which he need not further refer. With regard to the quality of Indian cotton, there were gentlemen present who could say how much it had improved during the last few years. Some time ago, he took the opportunity of examining whether it was as short in staple as it was alleged to be. The result of the examination of a great number of samples was, that on an average, he found the

Indian cotton only one-tenth of an inch shorter than New Orleans cotton, whilst it was equal, in this respect if not superior, to the New Orleans samples—and in others equalled many of the fine Sea-island qualities. There was no doubt that facilities for cleaning the cotton had a great deal to do with the question of obtaining a large supply from India. Mr. Crawfurd had spoken in disparagement of the introduction of the cotton gin into India, but he did not appear to be aware of the fact that at present the government factory was unable to turn out a sufficient number of gins to meet the demand of the natives who came with the money in their hands to purchase them; and that a gentleman was deputed to come to this country in order to get a supply manufactured in this country. Their names were entered in a book, and there was quite a rush to get a supply of that implement. The saw gin was essential no doubt for the cleaning of American cotton, though it was not adapted for the cleaning of Indian cotton, but the implement now exhibited (a roller gin) settled the point. Mr. Crawfurd had stated the cleaning of the cotton in India to be a very slow process; and he claimed for the Whitney gin that it had created a revolution in the supply of American cotton. He (Dr. Watson) claimed for Dr. Forbes's gin, now before the meeting, the same prospective merit with regard to Indian cotton. With this machine a boy could clean ninety lbs. of cotton per day, and sixteen of these machines, driven by bullocks, would clean a ton of cotton per day, which was equal to the ordinary day's work of 750 people. It had been stated that in India the natives did not, and would not, grow good cotton; and various other products had been mentioned in the paper, as showing that they preferred giving their attention to such productions as only required a rude system of cultivation. Amongst other articles, opium was mentioned.

Mr. Crawfurd said he had mentioned it as an article of easy production. It was a foreign commodity, but easy of cultivation, and no particular skill was required in the manufacture. Old women and children collected the juice from the poppies in shells, and it was altogether a crude operation.

Dr. Forbes Watson accepted the explanation, but the argument remained the same. The great deterioration of Indian cotton arose during the picking, and if they could get the natives to exercise as much care in the picking of the cotton as they did in collecting the opium from the capsules of the poppies, they would have as clean cotton from India as that which they were now receiving from America. It was a question of giving the natives an interest in producing clean cotton, and if they did that they would get it in abundance. He believed it had been proved that India was capable of supplying not only the quantity but the quality of cotton they required. There were many other points in the paper which he would not now enter upon, but, seeing the number of practical gentlemen around him, he had no doubt his deficiencies would be supplied before the meeting was over.

Mr. Wanklyn said he appeared there as the representative of the Cotton Supply Association, and had been requested to attend on the spur of the moment to collect the facts which he knew would be laid before this large assembly by the gentleman who had introduced this subject. They were aware that cotton was spun into threads which were classified numerically. The cotton they had been in the habit of receiving from India, and the lower qualities from America, were only fit for the coarser numbers of threads. The Indian was spun into from 20's to 40's, the Egyptian from 40's to 50's, and the long staples from 80's upwards. The quality of Indian cotton had been called in question that evening. He was there to give his testimony that India was capable of producing all the classes of cotton which they required for the general manufactures of this country. In 1852, he commenced using Indian cotton, but it was so intermixed with dirt and other foreign substances, that there was an enormous loss upon it, and they could only speak of it as fit for No. 16 thread. Between that period and 1857, the natives had paid more attention both to the cultivation and the picking, and in that year he spun Indian cotton up to No. 24, which was equal to the middling descriptions of American cotton, and showed an improvement in the capabilities of India for producing cotton of nearly 50 per cent. That was in a period of five years, and a few days ago he saw in Manchester Indian cotton up to 40's. They were constantly told that a better quality of cotton did not exist in India. To the great praise of the government, they had sent home a large quantity of goods made by the natives of India, and sent at the same time a quantity of the cotton from which they were made. By the favour of Dr. Forbes Watson, he had examined those articles at the India Board. He unravelled a portion, and found it to consist of a superior kind of cotton to any that had been received in this country. The question might be put to him, why he did not contrive to use that cotton? and that raised the question of supply and demand. In 1857 he was obliged to give up using it, because he could not obtain a sufficient quantity to keep his mills going for more than a few months in the year. The fact was, there was such competition for the superior qualities of Indian cotton, that he could not get enough to keep his machinery going. What they wanted was a steady supply to keep the mills going all the year round, and not to work, as it were, oat-meal one part of the year and wheat-flour another part. He believed it would be found that we had ourselves been guilty of interfering seriously with the law of supply and demand in the United States of America; that was, with respect to the question of slave labour, though it was not a matter of reproach to this country, but one of pride, that we had interfered very largely with the supply of an article produced by slave labour. Another fallacy of Mr. Crawfurd's, in reference to the law of supply and demand, was, that the price of American cotton was considerably higher at the present time than it was at the corresponding period of last year, whilst the increased quantity of machinery in this country had made our requirements 10 per cent. larger, while the supply was 20 per cent. less. By letters he had received from America he learned that the supply from the United States was 20 per cent. less than it was last year, making a total deficiency of 30 per cent., notwithstanding the supposed law that a demand would always produce a corresponding supply. There was one error on the part of Dr. Riddell which he wished to correct. That gentleman was labouring under the impression that the manufacturers of Lancashire intended to send persons out to India, to teach the natives the best modes of cotton cultivation. They had no such intention. Their actual determination was to send persons out to purchase cotton in India, and to devise the best means of putting themselves into direct communication with the natives, and he could bear testimony to the cordial support with which the government, both in this country and in India, had met the Lancashire manufacturers. The association with which he was connected, in conjunction with another association for similar objects, was on the point of sending out a commissioner to India, to ascertain from his personal investigation and inquiry the capabilities of India to produce the quality of cotton they required, and he was happy to say the government had, in the most handsome manner, placed at the service of those associations the valuable assistance of Dr. Forbes: and he trusted in a few months they would be in possession of a report from the government, corroborated by commercial persons as the result of their investigations, and which would be in all respects satisfactory in the great objects they had in view. Mr. Crawfurd had called in question what he (Mr. Wanklyn) considered the very praiseworthy act of the Governor-General, in the minute or order that he had recently issued. In his humble opinion, Lord Canning was entitled to our warmest thanks for that most wise order, and for disregarding the prejudices and traditions of the old

India Board, which had for so long a time frittered away the vast resources of that country. In conclusion, he would say, the difference between India and the United States in respect of the growth of cotton, was this:—In the one country they had Anglo-Saxon energy, Anglo-Saxon means, and everything else pertaining to the Anglo-Saxon race, except slave labour. In India they had a vast supply of labour, but the Anglo-Saxon energy was wanting. Let them throw open that vast country, place the cultivators of India in the same position as the cultivators of the United States, and in a very short time England would be independent of a country, which was at present blackened by slavery, for the chief supply of one of the most important staples of natural industry.

The Chairman explained, on behalf of Dr. Riddell, in reply to Dr. Forbes Watson, that what he intended to say was, that in the present state of intelligence of the natives of India, they were incapable of managing cotton gins of even the most simple construction.

Sir Thomas Phillips was reluctant to intrude amidst the practical statements they had heard, from gentlemen so well acquainted with the subject, brought before them that evening, but he rose to express the regret he should feel if this paper, coming from a gentleman whose opinion was entitled to respect, should have the effect of discouraging the efforts which were now being made in this country to increase the growth of cotton in India—a country in which we were so deeply interested, and for which we had made such large sacrifices. He did not deny that we might have miscarried grievously during some portions of our rule; but he trusted we were now more alive to the duties that were entailed upon us as the rulers of one of the largest communities in the world, and it was our duty to step aside from the cut-and-dried formulas of opinion with regard to supply and demand, in order to stimulate the production of a commodity of so much importance to the commerce and well-being of this country. If it were certain that America would continue to produce, year after year, the quantity of cotton which we had taken of them of late years, even then, he contended, the necessity and duty existed of looking to some other country for a large additional supply. They must consider the enormous growth of the manufacture itself, and the necessity that would arise for providing for larger quantities than America supplied, if even she continued to keep up the supply equal to what we had hitherto received. So late as the year 1820, the cotton imported from America was only 150 millions of lbs., whilst in 1859 it amounted to 1,200 millions of lbs.; the importation of cotton had therefore increased eight-fold in that period. Then let them take the export of cotton fabrics. Those of 1820 amounted to £16,000,000 sterling; in 1840 they had increased to £24,000,000, showing an increase of £8,000,000 in twenty years, but between 1840 and 1859 they had doubled, the increase being £24,000,000 as compared with £8,000,000 in the preceding period of the same length. He dealt with these figures to show the largely-augmented demand for cotton, and the necessity, apart from the present condition of America, for ensuring to our manufacturers a supply of that which was as great a necessity as food; for it was as important to supply the working classes with the means of continuing their work, as to supply them with the means of obtaining food. But it might be asked, how did he look forward to any large or important supply of cotton from India? India had already exported large quantities, and here he would allude to the paper read last session, by Dr. Forbes Watson, on the fibrous plants of India, which was the most valuable history of the textile materials of India he had ever met with; and it was from a reference to that work that he found that the annual exports of cotton from India averaged 240,000,000 lbs. from 1851 to 1858; that in one year alone, we received from that country 319,000,000 lbs., which was double the entire importation of cotton into England, from all parts of the world, not more than forty years ago. Let them regard the fact that India had exported double the quantity of cotton which we required forty years ago, and could they then have any doubt as to the future capabilities of that country in this respect? He was therefore surprised at the conclusions at which his friend Mr. Crawfurd had arrived at the end of his paper. It seemed to him that Mr. Crawfurd had collected materials showing that all that was wanted to make India a great cotton-producing country, was European capital and energy, better cultivation of the soil, and improved means for preparing the article for the market. He was thankful to Mr. Crawfurd for presenting a paper which contained many statements well worthy of consideration, although opposed to popular opinions upon some points. The paper was a valuable one, as containing facts arising from his own personal knowledge and experience; valuable, also, because it had elicited opinions of a contrary nature. The value of these meetings consisted, to a great extent, in the discussions which the papers gave rise to, for by such means it might be hoped that truth would be arrived at.

Mr. William Hawes remarked that the general characteristic of the paper was, that they must rely upon America for their supply of cotton, and take no pains to provide for it elsewhere. That was the tone that pervaded the paper throughout. They were told that they must rely upon the supply of cotton from those who employed slave labour, and neglect those other parts of the world where negro labour was equally available, but without the condition of slavery. In this respect, the eastern coast of Africa was particularly deserving of their attention, inasmuch as by the introduction of European capital and enterprise, that quarter of the globe could produce a large supply of cotton, not enough for our wants, but an annually increasing quantity to assist in the general supply which this country required. They had been told in the paper that the cotton of Africa was scarcely worthy of notice. That might be true at the present time, but that did not make it a country which ought to be neglected, as had been argued that evening. There was, in the dominions of the Imaum of Muscat, a large extent of country adapted for the cultivation of cotton. The plant was indigenous to the country, and there was an ample supply of labour which only wanted direction. Let them send capital and machinery there, and they would soon have an increased supply of cotton in return. But according to the argument of Mr. Crawfurd, they were to neglect those great districts, which nature appeared to have marked out, in favour of America, which had been supplied with a large amount of labour, enterprise, and capital from this country, without which the Southern States of America would have been in the same condition as India was at the present day.

Mr. P. L. Simmonds said he had followed closely, and with some attention, the observations of Mr. Crawfurd, and while giving him due credit for the great research evinced in the wide field of inquiry over which his observations extended, and for the boldness of the opinions advanced, he must, in common with most of the preceding speakers, differ entirely from those opinions. He (Mr. Simmonds) would confine his remarks to but one or two points, in order to leave the field of discussion open to other speakers, of whom he saw many present thoroughly competent to reply. Mr. Crawfurd complained that, while European capital, skill, and enterprise had been turned to the production of sugar, indigo, coffee, and other staples in India, little or no attention had been given to cotton, which was there one of subordinate consideration as regarded quality and husbandry, and he also cited the instances of silk, stick-lac, and other products. Now the argument, as far as regarded some of these, scarcely held good. In stick-lac there was no culture; it was a spontaneous product of the forests, and the productive manufacture of the resin and dye had long been practised in India. Sugar was also alluded to, but the inferior sugar formerly made was, in fact, the jaggery, or goor, from the date, palmyra, and other palms, which, while

adapted for local use, was unsuited for export to European markets. That made now was produced from the cane. The Hindoos were intelligent and apt pupils enough, and capable of producing anything for which they were adequately paid. But to return to the staple more immediately under discussion—cotton and its supply, a subject which had frequently been discussed before the Society, and investigated in almost all its aspects, from the culture in the United States, as detailed by his friend Mr. Leonard Wray; by Dr. Forbes Watson, and Mr. J. B. Smith, M.P., on production in India; by Mr. Ashworth, on the cotton ma nufacture, and others. Now there was a strange discrepancy in the remarks of Mr. Crawfurd as regarded cotton culture in the West Indies. After stating that seventy years ago our West Indian colonies, insular and continental, furnished us with our chief supply of cotton, and that now we received but a very small quantity from thence, he inferred the unsuitableness of the West Indian islands generally for the production of cotton, because the cane had superseded it; and he further cited Bryan Edwards as an authority for the precariousness of the crop. Now while he bore willing testimony to the value of Edwards's excellent history of the West Indies, Edwards was better known as a historian than as a planter. From his own personal experience of three or four years in Jamaica, he (Mr. Simmonds) could only say that there were large districts of that fine island admirably suited to the cultivation of cotton, which could grow it, and had grown it, successfully, whether as regarded soil or climate. But the question of labour in this as in other crops stood in the way. Sugar cultivation, too, paid much better, and was more in demand until of late years, and hence the efforts to grow cotton were given up, as they had been in British Guiana. Capital had been invested in expensive machinery and plant for sugar-making, and this could not well be sacrificed. Then, with regard to the production of cotton in Western and Central Africa, it was by no means so delusive a field as Mr. Crawfurd would lead them to believe. Listening to his arguments, the opinion would be held that cotton was a most difficult cultivation. Now it was perhaps one of the most simple of all tropical productions, if planted in favourable soil, at the proper seasons, and kept free from weeds. It required, indeed, no culture at all in many localities, although, no doubt, it improved much under proper management and with occasional change of seed. There was a good deal of cotton to be obtained even now from parts of Africa; but he heard only a day or two ago, from a well-informed African merchant, that the shipment of cotton from the coast was discouraged because it was a bulky article as regarded freight, difficult to ship on most parts of the coast, and far less remunerative than dye woods, ivory, and palm oil. If, as Mr. Crawfurd had admitted, palm oil had done so much to stop the slave trade, why should not the extended production of cotton be equally beneficial, both on the east and west coasts. Instead of dealing in slaves, as was now so largely done at Zanzibar, the Imaum might direct his attention to cotton. From what he knew of Mr. Crawfurd, and the pleasure he took in provoking animated discussions in the various learned societies in which he took so active a part, he had no doubt that the paper just read was penned with the best intentions. So far from really disparaging new fields of cotton supply, and discouraging the efforts being made to extend its growth, so that it might keep pace with the increasing wants of commerce, the object no doubt was to court inquiry, to stimulate reply, and to elicit the opinions of those competent to speak on the matter by the friendly gauntlet which had been thrown down. While he differed from Mr. Crawfurd as to the probability of the Arracan and Burmese alluvial coasts being favourable for extended cotton culture, whether as regarded soil or climate, and more especially with rice as an alternate crop, he perfectly agreed as to the suitability of parts of Queensland for the growth of cotton. So far, however, from our knowing little of its capabilities for this special object, it had many years ago been brought under the notice of the Manchester manufacturers by an intelligent and zealous colonist, Dr. Lang, who had produced beautiful specimens of cotton. That gentleman had published several works here, and tried over and over again to form a cotton company. His patriotic labours had lately been recognized by the legislature in Australia, and under the management of the present governor, Queensland (better known under its old name of Moreton Bay) might, if adequate labour were obtained, go in successfully for cotton culture in conjunction with its main staple, wool. No extraordinary efforts were called for to promote cotton culture anywhere, yet much good might arise hereafter to our great manufacturing interests, if attention were now and then drawn to those parts of the British possessions that are suited to the production of cotton, and it was shown that there was always a market here for the staple at remunerative prices.

Mr. Thomas Bazley, M.P., speaking of the importance of the subject of cotton supply, said he knew of nothing more saddening than the contemplation of the possibility of a great community being able and willing to work, but not having the material wherewith to employ their industry. The excellent paper of his friend Mr. Crawfurd was replete with valuable information, and his general conditions he agreed with, but his gloomy conclusions he dissented from. There was no doubt that India was capable of growing a very excellent quality of cotton, such as would supply the markets, not only of Lancashire, but of the world; and Dr. Riddell had not done himself justice in his remarks that evening, because some years ago he brought into Manchester specimens of cotton from India, which if grown in large quantities, he (Mr. Bazley) did not hesitate to say, would supersede to a great extent the supply from New Orleans and the Southern States of America. He had had under his inspection cotton of beautiful quality, grown in the East Indies. But there were serious difficulties connected with the extension of the cultivation of cotton in India. At the present time cotton, which was worth three-halfpence per ℔. in India, cost threepence per ℔. to bring it to Liverpool, being 200 per cent. upon the cost. Cotton, for which the ryots obtained 2d. per ℔., was now offering in Liverpool at 6½d., the charges for carriage, &c., having added 200 per cent. to the price paid to the cultivator. As an importer of cotton from the United States, he could tell them from his own knowledge, the average cost of bringing the cotton from the plantations to the market of Liverpool did not exceed 12½ per cent., therefore the planter received the maximum portion of the price paid for the cotton; and the large price he obtained was the great stimulus to exertion in the production of the commodity; and until we could give a similar stimulus to the Indian cultivator, we should continue to be deprived of cotton, which otherwise, he believed, would be produced in very large quantities. Africa was capable of producing beautiful cotton. The palm oil trade, to which allusion had been made, was a proof of the energy possessed by the negro race. This trade had sprung up within the last thirty years, being created in a great measure by the large demand for that article for lubricating purposes on the railways. He knew no reason why they should not have as good cotton from Africa as they had from America. It was only about three-quarters of a century since they received the first supply of cotton from the United States, and seven years since they received the first cotton from Africa; and he had great pleasure in stating that the quantity had been annually increasing; therefore there was every cause for hope and encouragement. The extent of British territory capable of producing cotton was so vast that it was a disgrace, and a wonder at the same time, that we had so small a supply from our British possessions. He would particularly call attention to Queensland. The cotton of that district was of exquisite fineness and beautiful quality, and from information he had received as to the cost of production, and the capabilities of the soil, it was his

deliberate conviction that nothing was so profitable on the face of the earth as cotton cultivation would be in Australia at the present prices. He had been told that that soil was capable of producing 600 lbs. of cotton per acre; and although he had paid from 19d. to 2s. per lb. for Australian cotton, he presumed the price in the English market would average about 16d. 600 lbs., at 16d. per lb., would yield £40 per acre. In the United States, one negro had charge of ten acres of ground; therefore, the cultivator in Australia would have an aggregate return of £400 from the labour of one able-bodied labourer, whether Chinese, negro, or Hindoo. Of course women and children would be employed in the picking season, and, therefore, gold-gathering at the present time was not so profitable as cotton-cultivation would be in that colony. He viewed with disquietude the prospects of America. They had hitherto been designated as the United States. They might now speak of them as the disunited States. Hitherto the Southern States had received their great supplies of food from the Northern States, but in the state of things to be anticipated, the South would be obliged to raise food for itself; and a large portion of land, now cultivated with cotton, would have to be appropriated to the cultivation of food. He thought there was great doubt whether the negro would continue to be depressed under the system which at present prevailed; but the price of labour in the Southern States of America was an important item in the consideration of this question. The price of a negro was about £350 before the present political convulsion took place. They could not estimate the interest of money-compensation, and deterioration of the life of the man, and his possible death, at less than 15 per cent.; that would amount to £50 per annum. Then the man must be fed and clothed; and altogether he believed the best negro hands cost the proprietors at least 30s. per week previous to the outbreak in the States, and yet they upheld a system of cultivation in the Southern States which imposed the utmost degradation upon human nature, at a price as regarded the cost of labour beyond what the civilised workman in Europe was obtaining as his wages. He believed, by a little attention being directed to this subject, great efforts would be made to emancipate the industry of the South from the degradation to which it had been so long subjected. They never had the fact before them that sugar, the produce of free labour, was obtained of good quality from India. Thus they saw that India could and would supply all those articles which we so much required. He hoped the present assembly would continue to pay attention to this subject, and that the capital, intelligence, and energy of the country would be employed in this great matter, both in India and our other possessions.

Mr. John Jones asked whether Mr. Crawfurd could give them any information as to the prospects of the cotton manufacture in India. That country had from time immemorial been celebrated as the repository of the best cotton manufactures in the world, and notwithstanding the great perfection to which the machinery of the cotton mills in this country had been brought, the manufactures of India were still superior to those of England. He should be glad to be informed whether it was likely that the mills erected in Bombay, and which were said to be paying a profit of 10 or 15 per cent., would interfere with those of Lancashire. It occurred to him that a country which yielded enough cotton for the clothing of 150,000,000 of people, each person using about 4 lbs. per annum, making a total quantity of 600,000,000 lbs.—it occurred to him, that if mill labour were entered upon to any great extent in that country, with labour at 2d. or 3d. per day, it would have a material effect upon the home trade with India in manufactured goods. With all our superiority of machinery, we had never been able to produce anything equal to the Dacca muslins. It was a question which the Lancashire people would do well to think about, as to how far there was a probability of Indian manufactures coming into the market in competition with the goods from the Lancashire mills. They might reasonably suppose that when the Indian manufacturers had a taste of the large profits made by the gentlemen of Lancashire, they would be anxious to participate in them.

Mr. David Chadwick rose to suggest the adjournment of the discussion, as there were many present who were desirous of expressing their opinions. He did not share in the compliments that had been paid by Mr. Bazley to the author of this paper, as he (Mr. Chadwick) considered it was a collection of misconceptions and mistakes, and he thought an opportunity should be afforded of removing the impressions which the publication of the paper would tend to convey.

Mr. Henry Ashworth, as a cotton manufacturer, wished to acknowledge the obligations they were under to this Society for having from time to time raised the question of cotton and cotton supply, and for the discussions, which he believed had been profitable in this part of the country as well as in Lancashire. He would say, as regarded the question asked by a previous speaker (Mr. Jones), so far as the manufacture of Dacca muslin was concerned, it was impossible for an English manufacturer to give any answer whatever; but in speaking of the erection of mills, and the manufacturing processes recently introduced into India, he could only say the establishment of those mills had been the offspring of the protective policy of the Indian government. The present government had increased the tariff upon the introduction of manufactured cottons, and by reason of that increase of tariff, the difference in price between cotton manufactured on the spot, and that brought to Manchester and returned to India as manufactured goods, amounted to something like 25 per cent., with 25 per cent. profit beyond that which the British manufacturers obtained. They, it appeared, were enabled to make a division of profit equal to 15 per cent. From such a disclosure, which he believed to be correct, it would be understood, that, were Indian goods unprotected, they would cease to be manufacturers, or rather it was more probable that they would never have begun to be manufacturers; and it was by reason of the protection afforded to these mills that joint-stock companies had been brought into operation, and from one to two millions sterling of capital subscribed within the last two years to compete with the English manufacture. Had the Governor of India been a free trader, and not a protectionist, he would have employed a customs officer in every mill to measure the yards of cloth produced, and have taxed them to the same extent as he would tax the cloth shipped from England. If protection meant anything, it meant favouritism, and if Indian manufacturers were not specially intended to receive favour, then customs officers would be placed in the mills in the same impartial manner as they were placed in the ports of reception. This explanation would account for the profit of 15 per cent. being realised by Indian manufacturers who had 25 per cent. of margin to go upon. Upon the subject of cotton growth and future supply, he acknowledged the paper was full of valuable information, and in most respects but little wide of the mark. Mr. Crawfurd had spoken of seven countries as producing cotton, and had stated that the production of the United States constituted 78 per cent. of the cotton consumed in this country, whilst of the remaining 22 per cent. India furnished the largest portion. It would be a great mistake to suppose that the large portion which had been alluded to as coming from India was available to the manufacturers of this country to the extent the quantity implied. Referring to the imports of last year, he found they received from India 560,000 bales of cotton, but so large a portion of that amount was mere rubbish, that only 173,000 bales had been used in this country, and they had exported more than twice as much as they consumed. The reply which would suggest itself upon that statement was—had the cotton been equal to our wants in regard to quality it would not of necessity have been exported, but would, very probably, have been consumed at home.

However, if we were to have a larger supply of cotton from our possessions in India, as had already been announced, it would be unavailing altogether to promote the growth and importation of cotton from that quarter, unless it were of a quality that we could consume. We had the evidence of Dr. Forbes Watson and others, to the effect that India could grow good cotton, and could produce it of almost every quality we required. But the secret of production did not consist altogether in the extent of country which possessed a soil and climate suitable for the growth of cotton; the three great elements of enterprise, intelligence, and capital were still more requisite, and those elements, when placed under proper regulations, would command both the quality and the quantity of cotton we required. If they carried the investigation of these things a little further, they would conclude that since India was so well supplied with soil and climate, if it possessed the three elements, viz., enterprise, intelligence, and capital, it could not fail to produce an abundant supply. There was no doubt that there was capital, both in India and in England, ready to flow in that direction; but as this did not happen, there must be some obstacle in the way. If there were any such obstacle, let it be discovered and remedied. We had large capitals employed in our Indian possessions in the cultivation of sugar, indigo, lac dyes, and other articles, the production of which had not only increased in quantity, but improved in quality, under European management, whilst cotton was the only staple article of India which had not been improved in quality, and which had not received that attention from capitalists which other articles had received. Sometimes they had heard it stated that it was the business of the master manufacturer to encourage the growth of cotton. There might be some men in Manchester who held that opinion, but the larger number, he believed, held the view that the growth of cotton was a distinct pursuit, and in no way connected with the manufacture of it. He could only say, that, as manufacturers, they were ready to produce any article which the world required in the shape of cotton clothing; but he thought it was too much to ask them to produce the cotton as well as to spin and weave it. In times of scarcity of corn, they had never heard of remonstrances with the millers that they did not grow enough wheat, and he considered that they, as manufacturers, were not responsible for any deficiency in the growth of cotton. They were willing to buy it at its fair value from any market in the world, and they asked no questions as to whether it was slave-grown or not. There were many other points of interest in this subject, but the time was passing away, and he hoped that on some other occasion during the present session the question would be revived, in order that more attention might be given to it, for he thought there was nothing in this country of half the importance of the cotton question and our Indian government. These two subjects were closely united, and he did not see how they could be separated. He spoke of this subject with delicacy, because it might involve a political question in relation to our Indian government. At the same time, it was to be remarked, as an unaccountable feature, that whenever an enterprise was projected in any part of the world, however remote, the money-finders were to be had in this country, and they saw these people taking shares with avidity in all manner of concerns in every part of the world. How did it happen, then, that they were so chary about investing their property in India? There was some mystery in that question which had the effect of hindering, not only the employment of European energy and enterprise, but European money also; and until that state of things was remedied, they might look in vain for any large quantity of cotton, or any great improvement in the quality of the supply from India.

Mr. Remington said they had been addressed by the theorist, by the distinguished man of science, and by the practical man and manufacturer. He appeared before them as a merchant of 17 years' standing in Bombay, and therefore ventured to make a few remarks upon the broad question which had been raised that evening. He differed almost *in toto* from some of the assertions that had been made. In the first place, he did not think it had been established that there was any general scarcity in the supply of cotton to the world. Six months had scarcely elapsed since they had the most unprecedented stock of cotton ever known in this country, but owing to the drought in America they were likely now to experience some scarcity in that article. With regard to India, it could produce all the cotton they could consume, if they would only buy it. The fault was with Manchester itself, as the manufacturers would only buy Indian cotton when there was no American cotton to be had. Indian cotton was 3d. per lb. below the price of American, and the quality was quite equal to the middling Orleans. The great hindrance to the export of Indian cotton hitherto had been the difficulty of conveyance. The consumption of cotton from that country averaged in former years 7,000 bales per week; at the present time it fell below 3,000 bales. Why was that? Because the preference was given by the manufacturers to American cotton. The supply was on the increase, but there was not a demand for it. If Indian cotton could be used with advantage, why was it not used? It was not sent to market dirty now. It was of beautiful quality, and he believed the growth could not be materially improved. It was dependent for the character of its growth upon the peculiarity of the soil. In India, useful descriptions of cotton could be produced, and in certain districts cotton of a very fine description. It was said that the Anglo-Saxon residents in India did not exert their enterprise there. He would say they were constantly endeavouring to do so under the old East India Company, who spent large sums of money in experiments upon cotton, and did all they could, save perhaps in the matter of roads; but in the great cotton producing district of Goojerat, the roads, if not all that could be desired, were such that the cotton could be brought down at a small expense. He differed from Dr. Forbes Watson as to the price that should be paid for the cotton. His (Mr. Remington's) opinion was, that with a less price than 5d. per lb. in Liverpool, it would be impossible to increase the growth of cotton in India.

The Chairman said he must now bring the discussion to a close by asking the meeting to pass a cordial vote of thanks to Mr. Crawfurd for his paper. Although all who had addressed them that evening differed more or less from that gentleman's views, he thought no one present would refuse to acknowledge the great critical acumen which was the characteristic of the paper, nor hesitate to recognise the sagacity which had been displayed in the investigation of topics of such deep interest as those which had just engaged their attention. It should be remembered that there had been persons who upon the starting of any new and great idea had shown themselves as critical and sceptical as Mr. Crawfurd might have been thought to be in his paper. He need only refer to the introduction of the locomotive engine by George Stephenson. In those days there were not wanting men of the highest standing as engineers who asserted that the locomotive could never be made to move upon rails, and who laid it down as a most positive certainty that it could never be made to drag a weight. He remembered, at even a still later period, a statement made by Dr. Dionysius Lardner, before the British Association, that a steam-boat could never be made to cross the Atlantic. His friend, Mr. Crawfurd, would therefore permit him to class his paper with the statement of Dr. Lardner. He seemed to have proved to his own satisfaction, though not to the satisfaction of those present, that in no other country could cotton be grown so well as in America; but he could nevertheless assure his friend he did not believe that the opinions he had enumerated would have the effect of checking that spontaneity of impulse which had been induced upon this question amongst the manufacturers of Lancashire, or would deter

them from taking up the enterprise they had in hand with all its risks, inasmuch as they had decided in Lancashire, that they would no longer be dependent upon America for their great supply of cotton. The subject was so extremely important, that he should be very glad if the Society could appropriate another evening to its discussion; but for the present, it was his pleasing duty to move a cordial vote of thanks to Mr. Crawfurd for his valuable paper.

Sir John Pakington, Bart., M.P., rose to second the proposition of the chairman. He had not presumed to take any part in the discussion, because he had attended rather as a listener and learner, but he was glad of the opportunity of seconding this well-merited vote of thanks, as it enabled him to express the deep interest with which he had listened to the paper, and to the discussion upon it, and he confessed it was not with the less interest, from the freedom with which the different opinions upon this subject had been expressed, and the views of Mr. Crawfurd criticised. Every public man must be conscious of the universal importance of this subject at the present moment. This was not the first time he had heard discussions of great interest in that room. For several years past, the attention of the manufacturing interests in Lancashire, and of public men in England, had been directed to the extreme importance of this question of the supply of cotton. The reason why this question had assumed so much interest had been owing to the natural apprehension arising from the state of the slave question in America; but now the evil which had been for some time apprehended had, in some measure, come to pass. The separation of the Northern from the Southern States had taken place. The point about which they as Englishmen ought to feel most anxious, was that that should be accomplished without civil war and without bloodshed. He hoped that might be the case. His belief was strong that the separation would take place; in fact it had taken place, and he believed it would not be revoked. Their anxious wish would be that it should be a peaceful separation. If it were a peaceful separation, he was disposed to think they might anticipate that the supply of cotton to our manufacturers from the Southern States of America would continue for a long time to be large; but he thought it impossible to regard the present state of America without feeling that there was risk and danger in this respect. And therefore the time had arrived when it became more than ever necessary for the great energy of the trade of England to be directed to the question—what were the quarters from whence they might hope with certainty for a supply of cotton. He believed in the great territory of India, there were several quarters from which that supply might come. From what he had heard that evening, there seemed to be little doubt that India alone could afford that supply; but he had reason to hope, by a proper supply of labour from China, they might look with confidence to Queensland. He had lately placed in the hands of his friend, Mr. Bazley, a communication he had received from the governor of that colony, in which he wrote in the most sanguine spirit as to the capabilities of that district if labour were supplied. His object in rising was to express his strong sense of the immense importance of this subject, and the satisfaction with which he had listened to the discussion that evening, because he could not help deriving from it a sanguine hope that there was no danger of the manufactures of this country not being, from some quarter or another, amply supplied with cotton.

The vote of thanks having been unanimously passed,

Mr. Crawfurd, in acknowledging the compliment, said he was the more obliged to the meeting because the majority of the speakers were opponents of his views. He was ready to oppose himself to them again on this question. With regard to the establishment of cotton mills in Bombay, he might state that £2,000,000 of capital had been invested in mills, the machinery for which had been sent out from this country. That was done under a protective duty, imposed under the advice of the late Mr. James Wilson—a most pernicious measure in his (Mr. Crawfurd's) judgment. The people of India, in the present condition of society there, could not compete with the people of this country, even if they were a different race from what they were. The profits they made were made at the expense of the manufacturers of this country. It was a similar sort of protection to that which was extended some thirty years ago with respect to the cultivation of tobacco in Ireland. There was no prohibition to the cultivation of that plant, until the late Sir Henry Parnell brought in a bill for the purpose, and then the Irish landlords and the Irish clergy, in the shape of tithes, claimed a benefit to their own pockets at the expense of the people of this country. In like manner, the people of India were getting profits at the expense of the manufacturers of Manchester. With respect to Lord Canning, he hoped it would not be thought that he was capable of saying a word disrespectful to him. His lordship had a most difficult task to perform, and had performed it well. He had conducted himself with firmness and courage, and at the same time with humanity and consideration, but he could not help thinking that his Excellency might just as well have left alone the encouragement of the importation of bad cotton into this country.

The Secretary announced that on Wednesday evening next, the 24th inst, a Paper by Mr. John Bell, Sculptor, "On Color on Statues; Color round Statues; and Paintings and Sculpture arranged together," would be read. On this evening Sir Thomas Phillips, Chairman of the Council, will preside.

The Secretary has received the following letter since the meeting:—

"Sir,—Mr. Bourne, who has been very many years a stipendary magistrate in Jamaica, would have been here to listen to Mr. Crawfurd's interesting paper if his health had permitted. He requested me, in case he should find himself unable to come, to show to the meeting three samples of cotton; one, which is Sea-island, and was purchased at Manchester, on the 2nd inst., at 1s. 6d. per lb.; the other two were grown in Jamaica, and picked from trees in Manchioneal, where the Jamaica Cotton Growing Company are now replanting the seed. Whether the cotton is quite as long in the staple as the Sea-island, will be decided by better judges of cotton than Mr. Bourne. An American cotton grower has valued one of these samples at 1s. 6d. per lb., and the Cotton Supply Association at Manchester value it at 1s. 4½d. per lb., and pronounce it to be excellent in colour and quality, and very long in staple. It is admitted that inferior cotton, such as the ordinary American and the East Indian are more generally used, but the time has come when we must strive for excellence in every respect, and whilst we do not neglect the claims and capabilities of the East Indies, we must not lose sight of the fact that, by making the West Indies prosperous, we should strike an effectual blow at the system of slavery all over the world. Mr. Bourne, had he been here, would have asked Mr. Crawfurd for information on a subject of considerable importance to the cause of freedom and humanity. It is not long since that Mr. Bourne called on a noble lord, who said to him, 'I have just had with me a judge from the East Indies, who stated that slavery is still carried on in that country in contravention of the law.' It seems that law is evaded by indenting children for a term of 99 years. If Mr. Crawfurd can assure us that this is not the fact, it will give great satisfaction to those who had hoped that slavery no longer existed in any part of the British empire or its dependencies.

"I am, &c.

WILLIAM BRANSTON."

Home Correspondence.

PRODUCTS AND RESOURCES OF TASMANIA.

Sir,—I was unexpectedly prevented from attending the meeting on the 10th inst., or I should have given verbally the few observations upon Dr. Milligan's paper with which I now trouble you.

It may perhaps appear somewhat ungrateful to ask for further information after the rather lengthy paper referred to, but Dr. Milligan may possibly be able to add a few points to, and thereby increase the value of, his very instructive communication.

In the first place, we might reasonably hope for a few more particulars relating to the food-products of Tasmania, both as regards their local preparation and consumption, and also the articles which are now, or may be hereafter, exported for this country.

Tasmanian wheat I quite believe to be of superior quality, as a general rule, to that consumed in Britain, whether of home or Russian growth; in 1857, a small sample of the grain was placed in my hands, which gave on analysis the following results:—

Water	**13·450**
Ash	**2·210**
Potassa	·265
Soda	·390
Magnesia	·233
Lime	·072
Sesquioxide of Iron	·024
Sulphuric Acid	·154
Chlorine	·053
Phosphoric Acid	·945
Silicic Acid	·026
Nitrogenous matter, Gluten, Albumine, &c.	**15·750**
Nitrogen	2·500
Carbonous matter (and loss)	**68·590**
Fat or Oil	1·425
Starch, Sugar, &c.	67·165
	100·000

In the preceding figures the proportions of nitrogen, fat, phosphoric acid, and alkalies, will be readily noted, as being distinctly above the average; I have frequently heard of the superior qualities of the barley of Tasmania, but have never examined samples.

Perhaps Dr. Milligan could furnish us with some more detailed particulars respecting those food products of Tasmanian growth, which are, or may be found, specially adapted to meet the requirements of the mother-country, and also concerning those plants it would be practicable and advisable to cultivate there for a similar object. It would be interesting to learn what edible roots, if any, could be profitably grown in Tasmania for British consumption; even a non-edible plant yielding large quantities of starch of fair quality, would supply a great and very generally felt want; if I am not mistaken, some rather considerable prizes are (or have been) offered in this country and in Belgium, for the discovery of a means of obtaining starch, suitable for manufacturing and general purposes, from a source not furnishing food for man.

Although perhaps the cost, delay, and risk, attending transportation, might prohibit the regular importation of many of the food-products of the colony which are of little comparative value, or are consumed in very large quantities, this objection could not apply to those generally somewhat costly substances from which the flavours, the perfumes, and the colouring matters of commerce are extracted.

I believe experiments have been made with the view of cultivating the vanilla plant, but I am not aware of the result. Then, again, if I am not mistaken, the fragrant *Acacia Farnesia*, and the *Comesperma volubilis*, and several varieties of *Eurybia* are already grown to a small extent in Tasmania, while it has been stated to me that the same country is favourable for the growth of the *Garcinia Cochinchinensis*, the *Rubia tinctorium*, the *Panax quinquefolium* ("*Ginseng*") the *Statice tartarica* (perhaps the most powerful tanning agent known) and many other plants of equal or greater importance.

What is there either to prevent Tasmania from supplying us with very large quantities of silk, manna, millet-sugar, and various textile fibres? And, as a final query, perhaps I may ask if any credence should be attached to the rumour—for it seems to be of no very definite character—that truffles of a fine quality have been found in the northern part of the colony.

Anything that tends to commence or extend the practice of importing to this country the products of any of its colonies or foreign possessions, must be regarded as of no mean importance to the interests of the countries concerned. Three advantages attend the movement, viz., the supplying of home desiderata by British subjects; the more rapid development of the resources of the colony itself, and, lastly, the check that can be had upon the quality of the articles imported, in other words, upon the practice of adulteration, should it be found to exist.

I am, &c.,

WENTWORTH L. SCOTT.

Bayswater, London, W., April, 1861.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Brit. Architects, 8.
Geographical, 8½.
Medical, 8½. Dr. E. Symes Thompson, "On Progressive Muscular Atrophy."

Tues. ...Antiquaries, 2. Anniversary.
Royal Inst., 3. Professor Owen, "On Fishes."
Civil Engineers, 8. Mr. George P. Bidder, Jun., "On the National Defences."
Medical and Chirurg., 8½.
Zoological, 9.

Wed. ...London Inst., 12. Anniversary.
Roy. Soc. of Literature, 4. Anniversary.
Society of Arts, 8. Mr. John Bell, "On Color on Statues; Color round Statues; and Paintings and Sculpture arranged together."
Geological, 8. 1. Mr. Joseph Prestwich, "On the Occurrence of *Cyrena fluminalis* at Kelsey Hill, near Hull." 2. Mr. Marcus W. T. Scott, "On the Shropshire Coal-field, more particularly as relates to the Great East or Simon Fault."
Archæological Assoc., 8½.
United Service Inst., 8½. Capt. E. P. Halsted, "On Iron Clad Ships."

Thurs...Royal Inst., 3. Prof. Tyndall, "On Electricity."
Roy. Soc. Club, 6.
Numismatic, 7.
Philological, 8.
Royal, 8½.

Fri. ......United Service Inst., 3. Major Miller, "The Italian Campaign of 1859. Part II., General Review."
Royal Inst., 8. Prof. Owen, "On the Scope and Appliances of the National Museum of Natural History."

Sat. .....Royal Inst., 3. Max Muller, "On the Science of Language."
Royal Botanic, 3¾.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 8th March, 1861.

Par. Num.
75. Public Debt—Account.
79. Hay, &c., Contracts—Return.
53. Bills—Labourers' Cottages.
62. ,, Votes for Disqualified Candidates.

Session 1860.

383 (D). Poor Rates and Pauperism—Return D.

Delivered on 9th and 11th March, 1861.

73. Poor Law—Return.
82. Navy (Deserters)—Return.
83. Army—Return
76. Bankruptcy—Return.
90. Parliamentary Boroughs (Assessed Taxes, &c.)—Return.
63. Bills—Red Sea and India Telegraph (Amended).
64. ,, Masters and Operatives.
Consuls—Statement showing the Alterations in Salaries.

Delivered on 12th March, 1861.

69. Divorce and Matrimonial Causes—Returns.
80. Bankruptcy—Annual Return of Accountant.
84. Court of Chancery—Annual Return of Accountant General.
44. East India (Mysore Family)—Return.
29. Railway and Canal Bills (127. Birkenhead, Cowes, and Newport (Extension); 129. Great Southern and Western (Capital, &c.) (Extension); 130. Henley in Arden; 131. Llanelly Railway and Dock (Lease, &c.) (New Lines, &c.); 132. Marlborough, Merionethshire; 133. Scottish North Eastern; 134. West Hartlepool Harbour and Railway (Capital &c.) (Running Powers, &c.)—Board of Trade Reports.

Delivered on 13th March, 1861.

86. Red Sea and India Telegraph Bill—Minutes of Evidence.
92. Court of Chancery—Copy of Commission.
93. Customs Acts (1860)—Return.
94. Clare's Iron Vessel Patents—Return.
96. Bills of Exchange—Return.
29. Railway and Canal Bills (135. Caledonian and Symington, Biggar, and Broughton; 136. Charing-cross (City Terminus); 137. Dunblane, Doune, and Callandar; 138. Kilkenny Junction; 139. Metropolitan (Extension to Finsbury Circus) (Improvements, &c.); 140. Uxbridge and Rickmansworth; 141. West London Extension; 142. West of Fife Mineral Railway, and Charleston Railway and Harbour—Board of Trade Reports.
56. Bill—Borough of Dublin.

Delivered on 14th March, 1861.

85. Naples—Return.
87. East India (Property Tax)—Return.
60. Local Acts (24. West London Extension Railway; 25. South Shields Improvements and Quay; 26. Tyne Coal Drainage; 27. Caledonian Railway (Rutherglen and Coatbridge Branches); 28. Cornwall Railway; 29. Londonderry and Lough Swilly Railway; 30. Andover and Retbridge Railway Extension; 31. Tyne Improvement; 32. Charing Cross Railway (City Terminus); 33. Mid Eastern and Great Northern Junction Railway; 34. Hull West Dock; 35. Kingston-upon-Hull Docks (New Works—Admiralty Reports.
61. Bills—New Trials in Criminal Cases.
65. „ Statute Law Revision.
Italy—Further Correspondence, Part 8.

Delivered on 15th March, 1861.

22 (1). Army Estimates (Manufacturing Department of the Army)—Statement.
71. New South Wales—Return.
81. Duchey of Lancaster—Account.
89. Felt and Scaleboard—Return.
97. Consuls (Alterations in Salaries)—Statement.
98. Hibernian Military School (Dublin)—Return.
102. Bullion—Return.
104. Maden *v.* Catanach, &c.—Return.

Delivered on 16th and 18th March, 1861.

77. East India (Local Armies)—Return.
101. Malt Duty—Return
99. Convicts—Return.
31. Cambridge University—Copies of Statutes.
59. East India (Military Finance Commission)—Return.
91. Royal Marines, &c.—Return.
100. Refreshment Houses, &c., Acts—Return.
107. Committee of Selection—Fourth Report.
60. Local Acts. 36. Hull and Doncaster Railway; 37. Swansea and Neath Railway; 38. Midland Railway (Additional Powers); 39. Cowes and Newport Railway Extension—Admiralty Reports.
55. Bills—Roads and Bridges (Scotland).
48. „ Holyhead Road.
58. „ Exchequer Bills.
67. „ Volunteers Tolls Exemption.
71. „ Greenwich Hospital Works.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, April 9th*, 1861.]

Dated 26th March, 1861.

755. H. Spencer and E. Taylor, Rochdale—Imp. in steam engines and boilers.
757. J. Smith, jun., Coven, and J. B. Higgs, Brewood, Staffordshire—An imp. or imps. in thrashing machines.
759. T. Davison, Belfast, and R. Paterson, Glasgow—Imp. in and connected with steam engines.
761. J. Savory, 143, New Bond street, and W. R. Barker—An improved "douche" for the ear and other parts of the human body.

[*From Gazette, April 12th*, 1861.]

Dated 7th December, 1860.

2998. C. J. Hill, Froliche-cottage, Turnham-green—Imp. in presses for stamping medals, embossing, and cutting or punching out metal or paper, and printing on paper, linen, or any other material.

Dated 14th February, 1861.

378. E. Rimmel, 96, Strand—A new process for impregnating the atmosphere with perfuming or purifying vapours.

Dated 5th March, 1861.

564. W. E. Newton, 66, Chancery-lane—Imp. in the process of cementation. (A com.)

Dated 7th March, 1861.

578. W. S. Kennedy, 16, Talbot-terrace, Bayswater—An improved method of and apparatus for imparting the motion of riding to wooden or metal horses, part of which is applicable to cradles and other similar appliances.

Dated 8th March, 1861.

588. E. Comte and E. Prevost, Chantilly, France—Imp. in the actual mode of scouring wools before and after the combing of the same.

Dated 11th March, 1861.

598. P. P. Mataran, 60, Rue Lalande, Bordeaux, France—Imp. in the construction of casement or French windows.

Dated 13th March, 1861.

616. B. Grundy, Ashton-under-Lyne, and S. Andrew, Knowls lane, near Lees, Lancashire—Imp. in apparatus for lubricating the piston rods, pistons, and cylinders of steam engines and other frictional surfaces of machinery.
620. G. F. Muntz, French Walls, near Birmingham—Imp. in sheathing iron ships or vessels.

Dated 14th March, 1861.

628. W. E. Gedge, 11, Wellington-street, Strand—An improved musical instruments, part of which are applicable to organs, harmoniums, and similar instruments. (A com.)

Dated 18th March, 1861.

674. A. Krupp, Essen, Prussia—Certain imp. in the method of securing tyres for rolling stock on their wheels.

Dated 19th March, 1861.

684. J. Jervell, Molde, Norway—Imp. in the preparation of fish and sea animals for manure, and in apparatus connected therewith.

Dated 20th March, 1861.

694. J. Watson, Jarrow, Durham, and T. B. Davison, Munster-square, Regent's-park—Imp. in the mode of applying and securing thowl pins or rowlocks to boats, barges, lighters, and all craft propelled by means of oars or sculls.

Dated 21st March, 1861.

708. J. Franks, 14, Little Tower-street—An improved mixture and preparation of teas.
712. C. Taylor, jun., Nottingham—An improved method of enabling the guard, or other person, to communicate with the engine driver, or vice versa in railway carriages, or railway trains, or similar conveyances, by means of electricity.

Dated 22nd March, 1861.

719. J. Victor, Wadebridge, and J. Polglase, Bodmin, Cornwall—Imp. in safety fuses for mining and other purposes.
722. R. A. Brooman, 166, Fleet-street—Improved means of colouring enamelled leather, leather cloth, enamelled metal, and other enamelled surfaces. (A com.)

Dated 23rd March, 1861.

732. W. H. Clarke, 3, Vernon-place, Bloomsbury-square—Imp. in commissariat ambulance cooking apparatus and appurtenances.

Dated 25th March, 1861.

742. J. T. Holden, Birmingham—An imp. in, or addition to, torines, boars, collars, and other like articles of dress females.
744. J. Grant, Mansfield, Nottinghamshire—Imp. in machinery or apparatus for twining or spinning and doubling cotton or other yarns and threads.
746. S. A. Beers, Brooklyn, U.S.—Imp. in rails for tram-roads, and in laying down the same in streets and highways.
752. T. Bentley, Margate—Imp. in making up, or packing, charges or small quantities of gunpowder, drugs, or other articles.
754. G. F. Morrell, Fleet-street—Imp. in the manufacture of sealing wax.

Dated 26th March, 1861.

756. S. Lamb, Manchester—Certain imp. in pipes for smoking tobacco.
760. H. Emes, St. John's-villas, Adelaide-road, Hampstead—Imp. in dress fastenings, which are also applicable to other fastening purposes.

Dated 27th March, 1861.

763. W. Spence, 50, Chancery-lane—Imp. in dressing or preparing the surface of mill stones. (A com.)
764. W. Grimshaw, Lytham, Lancashire—Imp. in machinery and apparatus used in drying, pulverizing, and compressing clay and other materials.
765. E. Briggs, Castleton Mills, near Rochdale, and S. Fearnley, Rochdale—Imp. in the manufacture of piled fabrics, and in the machinery or apparatus employed in manufacturing piled and other fabrics.
766. W. E. Gedge, 11, Wellington-street, Strand—Imp. in lamps. (A com.)
767. C. D. Abel, 20, Southampton-buildings, Chancery-lane—Imp. in the construction of wardrobes. (A com.)

768. J. M. Dunlop, Manchester—Imp. in machinery for cleansing cotton.
769. J. G. Willans, 2, Clarence-place, Belfast—Imp. in the preparation of hydrated oxide of iron, and the application of such prepared oxide for the absorption or separation of sulphur from certain gases.

Dated 28th March, 1861.

771. B. Brittain, Cowley-road, Brixton—Imp. in obtaining motive power.
772. J. Bremner, Leith—Imp. in steam boilers.
773. P. M. Parsons, Arthur-street West, London-bridge—Certain imp. in fire-arms, and in the method of rifling the barrels of the same.
775. L. J. Vandecasteele, Lille, France—Imp. in brewing.
776. J. Sanderson, Clerkenwell—Imp. in travelling bags or cases, and in fittings for the same, a part of which fittings is applicable to holding cigars and other like articles.
777. R. A. Brooman, 166, Fleet-street—Imp. in the manufacture of sheer steel. (A com.)
778. W. Sorrell, Haggerstone, Middlesex—Imp. in apparatuses for mashing malt.
779. W. Stratford, Mile-end, Old-town, Middlesex—Imp. in the construction of furnaces for heating steam boilers, bakers' ovens, and brewers' coppers, which imps. are applicable also to furnaces made use of for various other purposes.

Dated 30th March, 1861.

781. J. J. Field, Holloway-place, Holloway—Imp. in apparatus for evaporating in vacuo.
782. W. Simonds, Renfrew—Imp. in or connected with ships or vessels.
783. J. Griffiths, Richmond-park, Breck, Liverpool—Improved compositions or cements, and methods of applying the same to various parts of buildings and houses where slates, tiles, stones, and sheet metals have been used.
784. J. Rattray, Manchester—Imp. in window-frames, commonly called casements or French lights.
785. T. Sykes and C. Sykes, M.D., Cleckheaton, Yorkshire—Imp. in steam boilers, and the prevention of incrustation therein.
786. J. Cass, Bury—Imp. in steam engines and boilers, and in apparatus connected therewith.
787. G. Barton, Nottingham, and T. Soar, Radford, Nottinghamshire—Imp. in washing, wringing, and mangling machines, applicable also for dying or bleaching purposes, to be called "The Nottingham washing machine."
788. W. D. Napier, 22, George-street, Hanover-square—Imp. in the manufacture of rubbers for the human teeth and gums.
789. J. J. L. Guiblet and J. Rambal, 11, Wilmington-square, Clerkenwell—Imp. in keyless and other watches and timekeepers.
790. D. Sutton, Banbury—Imp. in apparatus for hanging gates.
791. C. A. Ehrenberg, Altona, Denmark—Imp. in the construction of ships' compasses.
792. H. Medlock, Great Marlborough-street, Westminster—Improved means for preserving fermented liquors.
793. T. Simpson, Darfield Fire Clay Works, Yorkshire—Imp. in apparatus for the manufacture of bricks.
794. O. Earle, Liverpool—An improved lubricating compound.
795. R. Ridley, Low Wortley, and J. Rothery, West Ardsley, Yorkshire—Imp. in hewing or working coal and other minerals, and in the apparatus employed therein.
796. J. Briggs, 42, Bridge-street, Blackfriars—Imp. in the manufacture of an artificial substance to be used as a coating or covering for stone, bricks, wood, or metal, and also in the method of, and means for, manufacturing flags, bricks, blocks, or paving, from the said substance.

Dated 1st April, 1861.

797. G. Russo, Genoa—A new method of colouring as a substitute for saffron in the manufacture of cheese, pastes, and other articles in which saffron is employed.
799. J. Lowe, Glasgow—Imp. in the mode of applying colouring matter to certain textile fabrics and yarns in the process of dying and printing.
801. S. de Sarges, 23, Northumberland-street, Strand—Imp. in mattresses, cushions, and such like articles.
803. R. James, Faversham—Imp. in reaping and mowing machines.
804. R. A. Brooman, 166, Fleet-street—An improved method of fixing lac and lac varnishes upon glass and ceramic ware. (A com.)
805. J. Gardner, Eversholt-street, Middlesex—Imp. in portable buildings or structures.
806. W. Palmer, Ballymena, Antrim—Imp. in machinery or apparatus for grinding wheat and other grain.
807. W. Brookes, 73, Chancery-lane—Imp. in means or apparatus for obtaining superheated or surcharged steam, and for increasing the draft through the flues of locomotive and other boilers. (A com.)

Dated 2nd April, 1861.

809. J. G. Winton and T. W. Cowan, 42, Bridge-street, Blackfriars—Imp. in the means for actuating machine hammers, which said improvements are also applicable to pile-driving, and other such-like machines and purposes.
810. J. H. Winder, Sheffield—Imp. in means or apparatus for raising and forcing water and other fluids.
811. E. Horlick, Tredegar, Monmouthshire—An improved stand for exhibiting drapery or other goods for sale.
815. J. Brown, Glasgow—Imp. in preparing fabrics to render them suitable for packing goods, and in closing or sealing packages.
816. J. Sickels, 67, Gracechurch-street—Imp. in machinery or apparatus for stitching, uniting, and ornamenting leather and other similar materials. (A com.)
817. W. Clark, 53, Chancery-lane—Imp. in stamping presses. (A com.)

Dated 3rd April, 1861.

818. T. E. Wilson, Cornholme, near Todmorden, Lancashire—Imp. in machinery for agricultural purposes.
820. M. H. Blanchard, 74, Blackfriars-road—Imp. in the manufacture, construction, and ornamentation of articles made of terra-cotta, stoneware, and plastic clays, adapted for the construction of fire-proof stairs, steps, landings, slabs, tiles for roofing and paving, chimney shafts, columns for buildings, posts, or standards, pedestals, and statues, and in the method of moulding the same.
822. W. E. Newton, 66, Chancery-lane—Imp. in machinery for cutting and harvesting grain, grass, and other substances. (A com.)
824. A. C. Bamlett, Middleton Tyas, Yorkshire—Imp. in reaping and mowing machines.

[*From Gazette, April 9th*, 1861.]

Inventions with Complete Specifications Filed.

703. L. L. Tower, Massachusetts, U.S.—Relating to heads for lead pencils, ink erasers, and other articles of like character. (A com.)—20th March, 1861.
716. W. M. Cranston, 58, King William-street—Imp. in sewing machines. (A com.)—22nd March, 1861.
734. W. T. Henley, 46, St. John-street-road, Clerkenwell—Imp. in electric telegraphs and in apparatus connected therewith.—23rd March, 1861.

Patents Sealed.

[*From Gazette, 12th April*, 1861.]

April 12th.

2490. J. Blackwood and W. Blackwood.
2491. M. Strang.
2493. G. Wearing.
2496. R. A. Brooman.
2501. J. Higgins and T. S. Whitworth.
2504. J. T. Webster.
2510. A. McDougall.
2512. C. Burn.
2513. C. Burn.
2514. P. R. Smith.
2515. J. Bent and J. Luckock.
2517. C. J. Burnett.
2525. W. Henderson & J. Down.
2532. H. A. F. Duckham.
2536. W. Eades and G. Worstenholm.
2537. A. White.
2538. T. J. Marshall.
2541. E. Habel, J. Holzwasser, and E. Burns.
2561. W. Jamieson, W. Robinson, and C. Rowbottom.
2566. E. W. Hughes.
2568. J. Smith and J. Holt.
2572. A. Dietz.
2573. A. Dietz.
2575. W. E. Gedge.
2576. G. W. Hart.
2610. W. Sharpe.
2622. H. Lawson.
2650. I. Dreyfus.
2664. G. Davies.
2690. W. E. Newton.
2753. F. Preston and T. Kennedy.
2780. A. V. Newton.
2890. S. M. Fox.
3072. W. D. Allen.
3184. J. S. Russell.
74. W. H. Muntz.
80. W. H. Moran.
84. A. M. Foote.
130. W. Spence.
328. G. Jarrett.
399. J. H. Johnson.

[*From Gazette, April 16th*, 1861.]

April 16th.

2539. A. B. Jacout.
2547. J. Macintosh.
2554. J. Marsden.
2555. C. Hoare.
2617. W. Palmer.
2649. M. Henry.
2665. G. Davies.
2811. C. Stevens.
2861. W. H. Ralston.
41. W. Taylor.
69. B. B. Hawse.
75. W. H. Muntz.
145. B. Piffard.
229. T. A. Verkruzen and M. A. Verkruzen.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, April 12th*, 1861.]

April 8th.

775. P. Brun.
787. S. Bickerton.
806. J. Gorham.
857. E. K. Calver.
969. W. Clark.
781. D. McCrae.
783. A. Manbré.
784. J. Rae.
789. T. Kay.
944. E. Tomlinson.

April 9th.

767. H. Bayley and J. Greaves.

April 10th.

809. C. Mather & H. Charlton.

[*From Gazette, April 16th*, 1861.]

April 11th.

797. P. Schafer and F. Schafer.
803. W. C. Holmes and W. Hollinshead.

April 12th.

786. J. Bailey, E. Oldfield, and S. Oddy.
810. E. Green.
815. F. Preston and W. McGregor
817. L. Cowell.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, April 16th*, 1861.]

861. S. Colt.

Journal of the Society of Arts.

FRIDAY, APRIL 26, 1861.

INTERNATIONAL EXHIBITION OF 1862.—GUARANTEE DEED.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others who take an interest in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £383,600, have already been attached to the Deed.

GUARANTEE FUND FOR THE EXHIBITION OF 1862.

The following additions have been made since the last announcement, in the *Journal* for April 19:—

*** *The names marked with an asterisk are those of Members of the Society of Arts.*

NAME.	AMOUNT.	REPRESENTING THE OBJECTS OF THE SOCIETY—ARTS, MANUFACTURES, AND COMMERCE.
William Glen Eavestaff, 60, Great Russell-street, W.C.	£100	Manufactures.
James Lewis, 6, Bartlett's-buildings, Holborn, E.C.	100	Commerce.
Sir James Clark, Bart., Bagshot-park, Surrey	200	Arts.
Viscount Falmouth, 2, St. James's-square, S.W.	500	Arts.
Halliday, Fox, and Co., 4, Cullum-street, E.C.	100	Commerce.
Richard Hewens, Leamington Priory, Warwickshire	100	Arts.
George M. Story, 2, Coleman-street, City, E.C.	100	Commerce.
G. B. Richardson, 23, Cornhill, City, E.C.	100	Commerce.
W. J. Gifford, Ford, Wellington, Somerset	200	Arts.
W. and A. Gilbey, 357, Oxford-street, W.	1,000	Commerce.
Erskine Beveridge, Dunfermline	500	Commerce.
*John Ward, 5 and 6, Leicester-square, W.C.	500	Commerce.
Arthur Cobbett, 18, Pall-mall, S.W.	100	Commerce.
*H. E. Montgomerie, 17, Gracechurch-street, E.C.	100	Commerce.
Wm. Cooke, 26, Spring-gardens, S.W.	1,000	Arts.
Needham and Kite, Phœnix Iron Works, Vauxhall, S.	200	Commerce.
*Debenham, Son, and Freebody, Wigmore-street, W.	500	Commerce.
*Charles James Sadler, Mayor of Oxford	100	Commerce.
William Thompson, Sheriff of Oxford	100	Arts.
William Ward, Alderman of Oxford	100	Commerce.
John Crews Dudley, do. do.	100	Arts.
John Towle, do. do.	100	Manufactures.
Samuel L. Evans, Oxford	100	Commerce.
Joseph Plowman, Oxford	100	Arts.
William Christie, 1, Sussex-terrace, King's-road, Chelsea, S.W.	100	Arts.
Henry Cowper, Mayor of Banbury	100	Commerce.
Halling, Pearce, and Stone, 2, Cockspur-street, S.W.	1,000	Commerce.
Fred. H. Hemming, 104, Gloucester-place, Portman-square, W.	100	Arts.

By Order,

P. LE NEVE FOSTER, *Secretary.*

INTERNATIONAL EXHIBITION OF 1862.

AMENDED AND ADDITIONAL DECISIONS OF HER MAJESTY'S COMMISSIONERS ON POINTS RELATING TO THE EXHIBITION.

APRIL, 1861.

1. Her Majesty's Commissioners have fixed upon Thursday, the 1st day of May, 1862, for opening the Exhibition.

2. The Exhibition building will be erected on a site adjoining the gardens of the Royal Horticultural Society, and in the immediate neighbourhood of the ground occupied in 1851, on the occasion of the first International Exhibition.

3. The portion of the building to be devoted to the exhibition of Pictures will be erected in brick, and will occupy the entire front towards Cromwell-road; the portion in which Machinery will be exhibited will extend along Prince Albert's-road, on the west side of the gardens.

4. All works of industry to be exhibited should have been produced since 1850. The decision whether goods, proposed to be exhibited, are admissible or not, must, in each case, eventually rest with Her Majesty's Commissioners.

5. Subject to the necessary limitation of space, all persons, whether designers, inventors, manufacturers, or producers of articles, will be allowed to exhibit; but they must state the character in which they do so.

6. Her Majesty's Commissioners will communicate with Foreign and Colonial exhibitors only through the Commission which the Government of each Foreign Country or Colony may appoint for that purpose; and no article will be admitted from any Foreign Country or Colony without the sanction of such Commission.

7. No rent will be charged to exhibitors.

8. Every article produced or obtained by human industry, whether of

Raw materials,
Machinery,
Manufactures, or
Fine Arts,

will be admitted to the Exhibition, with the exception of,

1. Living animals and plants.
2. Fresh vegetable and animal substances, liable to spoil by keeping.
3. Detonating or dangerous substances.

Copper caps, or other articles of a similar nature, may be exhibited, provided the detonating powder be not inserted; also Lucifer Matches, with imitation tops.

9. Spirits or alcohols, oils, acids, corrosive salts, and substances of a highly inflammable nature, will only be admitted by special written permission, and in well secured glass vessels.

10. The articles exhibited will be divided into the following classes:—

Section 1.

Class 1. Mining, Metallurgy, and Mineral Products.
,, 2. Chemical Substances and Products, and Pharmaceutical Processes.
,, 3. Substances used for Food, including Wines.
,, 4. Animal and Vegetable Substances used in Manufactures.

Section II.

Class 5. Railway Plant, including Locomotive Engines and Carriages.
,, 6. Carriages not connected with Rail or Tram Roads.
,, 7. Manufacturing Machines and Tools.
,, 8. Machinery in general.
,, 9. Agricultural and Horticultural Machines and Implements.
,, 10. Civil Engineering, Architectural, and Building Contrivances.
,, 11. Military Engineering, Armour and Accoutrements, Ordnance, and Small Arms.
,, 12. Naval Architecture, Ship's Tackle.
,, 13. Philosophical Instruments and Processes depending upon their use.
,, 14. Photographic Apparatus and Photography.
,, 15. Horological Instruments.
,, 16. Musical Instruments.
,, 17. Surgical Instruments and Appliances.

Section III.

Class 18. Cotton.
,, 19. Flax and Hemp.
,, 20. Silk and Velvet.
,, 21. Woollen and Worsted, including Mixed Fabrics generally.
,, 22. Carpets.
,, 23. Woven, Spun, Felted, and Laid Fabrics, when shown as specimens of Printing or Dyeing.
,, 24. Tapestry, Lace, and Embroidery.
,, 25. Skins, Fur, Feathers, and Hair.
,, 26. Leather, including Saddlery and Harness.
,, 27. Articles of Clothing.
,, 28. Paper, Stationery, Printing, and Bookbinding.
,, 29. Educational Works and Appliances.
,, 30. Furniture and Upholstery, including Paper-hangings, and Papier-maché.
,, 31. Iron and General Hardware.
,, 32. Steel and Cutlery.
,, 33. Works in Precious Metals, and their imitations, and Jewellery.
,, 34. Glass.
,, 35. Pottery.
,, 36. Manufactures not included in previous classes.

Section IV.—Modern Fine Arts.

(*See Decisions* 111-123.)

Class 37. Architecture.
,, 38. Paintings in Oil and Water Colours, and Drawings.
,, 39. Sculpture, Models, Die-sinking, and Intaglios.
,, 40. Etchings and Engravings.

11. Prizes, or rewards for merit, in the form of medals, will be given in Sections I. II. III.

12. Prices may be affixed to the articles exhibited in Sections I. II. III.

13. Her Majesty's Commissioners will be prepared to receive all articles which may be sent to them, on or after Wednesday the 12th of February, and will continue to receive goods until Monday, the 31st of March, 1862, inclusive.

14. Articles of great size or weight, the placing of which will require considerable labour, must be sent before Saturday, the 1st of March, 1862; and manufacturers wishing to exhibit machinery, or other objects, that will require foundations or special constructions, must make a declaration to that effect on their demands for space.

15. Any exhibitor whose goods can be properly placed together, will be at liberty to arrange such goods in his own way, provided his arrangement is compatible with the general scheme of the Exhibition and the convenience of other exhibitors.

16. Where it is desired to exhibit processes of manufacture, a sufficient number of articles, however dissimilar, will be admitted for the purpose of illustrating the process; but they must not exceed the number actually required. (17—25.)*

26. Exhibitors will be required to deliver their goods at such part of the building as shall be indicated to them, with the freight, carriage, porterage, and all charges and dues upon them paid.

27. The vans will be unloaded, and the articles and packages taken to the places appointed in the building, by the officers of Her Majesty's Commissioners.

28. Upon receipt of notice from Her Majesty's Commissioners, that the articles are deposited in the building, exhibitors, or their representatives, or agents, must themselves unpack, put together, and arrange their goods.

29. Packing cases must be removed at the cost of the exhibitors or their agents, as soon as their goods are examined and deposited in charge of the Commissioners. If not removed within three days of notice being given, they will be disposed of, and the proceeds, if any, applied to the funds of the Exhibition. (30—34.)*

35. No counters, or fittings, will be provided by Her Majesty's Commissioners. Exhibitors will be permitted, subject only to the necessary general regulations, to erect, according to their own taste, all the counters, stands, glass frames, brackets, awnings, hangings, or similar contrivances which they may consider best calculated for the display of their goods.

36. Exhibitors, or their representatives, should provide whatever light temporary covering may be requisite (such as sheets of oiled calico), to protect their goods from dust; and, in the case of machinery, and polished goods, should make the requisite arrangements for keeping the articles free from rust during the time of the Exhibition. (37—42.)*

43. Exhibitors must be at the charge of insuring their own goods, should they desire this security. Every precaution will be taken to prevent fire, theft, or other losses, and Her Majesty's Commissioners will give all the aid in their power for the legal prosecution of any persons guilty of robbery o wilful injury in the Exhibition, but they

* Several numbers marked thus (*) in this and the following page are left blank, with the view of incorporating future decisions.

will not be responsible for losses or damages of any kind which may be occasioned by fire or theft, or in any other manner.

44. Exhibitors may employ assistants (male or female) to keep in order the articles they exhibit, or to explain them to visitors, after obtaining written permission from Her Majesty's Commissioners; but such assistants will be forbidden to invite visitors to purchase the goods of their employers. (45—49.)*

50. Articles once deposited in the Building will not be permitted to be removed without written permission from Her Majesty's Commissioners. (51—54.)*

55. Her Majesty's Commissioners will provide shafting, steam (not exceeding 30 lbs. per inch), and water, at high pressure, for machines in motion.

56. Persons who may wish to exhibit Machines, or trains of Machinery, in motion, will be allowed to have them worked, as far as practicable, under their own superintendence, and by tneir own men. (57—70.)*

70. Intending exhibitors, in the United Kingdom, are requested to apply, without delay, to the Secretary to Her Majesty's Commissioners, for a *Form of Demand for Space*, stating at the same time in which of the four Sections they wish to exhibit.

71. The following is the form which has to be filled up:—

1. Name and Christian name of applicant (or name of firm) -
2. Nature of business carried on - - - -
3. Address { No. of street or square, &c. - - - / and - - - / Name of town - - - - }
4. Nature of articles to be exhibited - - - -
5. Number of Class in which they are to be exhibited

Floor Space.

6. Probable Space that will be required for articles or case in which they will be shown - -

Length - - feet.
Breadth - - feet.
Height - - feet.

Hanging or Wall Space.

Height - - feet.
Width - - feet.

100. Foreign and Colonial exhibitors should apply to the Commission, or other Central Authority appointed by the Foreign or Colonial Government, as soon as notice has been given of its appointment.

101. Her Majesty's Commissioners will consider that to be the Central Authority in each case which is stated to be so by the Government of its country, and will only communicate with Exhibitors through such Central Body.

102. No articles of foreign manufacture, to whomsoever they may belong, or wheresoever they may be, can be admitted for exhibition, *except with the sanction of the Central Authority of the country of which they are the produce*. Her Majesty's Commissioners will communicate to such Central Authority the amount of space which can be allowed to the productions of the country for which it acts, and will also state the further conditions and limitations which may from time to time be decided on with respect to the admission of articles. All articles forwarded by such Central Authority will be admitted, provided they do not require a greater aggregate amount of space than that assigned to the county from which they come; and, provided also, that they do not violate the general conditions and limitations. It will rest with the Central Authority in each country to decide upon the merits of the several articles presented for exhibition, and to take care that those which are sent are such as fairly represent the industry of their fellow-countrymen.

103. Separate space will be allotted to each foreign country, within which the Commissioners for that country will be at liberty to arrange the productions entrusted to them in such manner as they think best, subject to the condition that all machinery shall be exhibited in the portion of the building specially devoted to that purpose, and all pictures in the fine art galleries, and to the observance of any general rules that may be laid down by her Majesty's Commissioners for public convenience.

104. By arrangements made with her Majesty's Government, all Foreign or Colonial goods intended for exhibition, sent and addressed in accordance with regulations hereafter to be issued, will be addmitted into the country, and transmitted to the Exhibition building without being previously opened, and without payment of any duty. But all goods which shall not be re-exported at the termination of the Exhibition will be charged with the proper duties, under the ordinary Customs' Regulations. (105-198.)*

109. It is not the intention of her Majesty's Commissioners to take any steps in reference to the protection of inventions or designs, by patent or registration, the law on these points having been materially simplified since 1851.

Decisions Specially Applicable to Section IV.—Modern Fine Arts.

Class 37. Architecture.
,, 38. Paintings in Oil and Water Colours and Drawings.
,, 39. Sculpture, Models, Die-sinking and Intaglios.
,, 40. Engravings and Etchings.

110. The object of the Exhibition being to illustrate the progress and present condition of *Modern Art*, each country will decide the period of Art which in its own case will best attain that end.

111. The Exhibition of British Art in this Section will include the works of artists alive on or subsequent to the 1st of May, 1762.

112. It is not proposed to award Prizes in this Section.

113. Prices will be not allowed to be affixed to any Work of Art exhibited in this Section.

114. One-half of the space to be allotted to Section IV. will be given to Foreign Countries, and one-half will be reserved for the works of British and Colonial Artists.

115. The subdivision of the space allotted to Foreign Countries will be made, after consideration of the demands received from the Commission, or other Central Authority, of each Foreign Country. It is, therefore, important that these demands should be transmitted to Her Majesty's Commissioners at the earliest possible date.

116. The arrangement of the Works of Art within the space allotted to each Foreign Country will be entirely under the control of the accredited representatives of that country, subject only to the necessary general regulations.

117. For the purposes of the Catalogue, it will be necessary that the Central Authority of each Foreign Country should furnish Her Majesty's Commissioners, on or before the 1st of January, 1862, with a description of the several Works of Art which will be sent for exhibition, specifying in each case, the name of the artist, the title of the work, and (when possible) the date of its production.

118. The space at the disposal of Her Majesty's Commissioners for the display of British Art being limited, and it being at the same time desirable to bring together as careful and perfect an illustration as possible, a selection of the works to be exhibited will be indispensable.

119. The selection of Exhibitors, the space and number of works to be allowed to each, and the arrangement of them, will be entrusted to Committees to be nominated by her Majesty's Commissioners.

120. In the case of living artists, her Majesty's Commissioners would desire to consult the wishes of the artists themselves as to the particular works by which they would prefer to be represented. The selection of works so made by the artists will not necessarily be binding on her Majesty's Commissioners, but in no case will any work by a living artist be exhibited against his wish, if expressed in writing, and delivered to the Commissioners on or before the 31st of March, 1862.

121. Her Majesty's Commissioners will avail themselves of the following eight Art Institutions of this country in

communicating with artists who are members of those institutions, viz.:—

The Royal Academy.
The Royal Scottish Academy.
The Royal Hibernian Academy.
The Society of Painters in Water Colours.
The Society of British Artists.
The New Society of Painters in Water Colours.
The Institute of British Artists.
The Institute of British Architects.

122. Intending Exhibitors in the British Division of Section IV., who are not members of any of the preceding Institutions, may at once receive Forms of Demand for Space, by applying to the Secretary to Her Majesty's Commissioners. These Forms must be filled up and returned before the 1st. of June 1861.

By Order.
F. R. SANDFORD,
Secretary.

Offices of Her Majesty's Commissioners,
454, West Strand, London, W.C.

CONVERSAZIONI.

The Council have arranged for two Conversazioni during the present Session; the first on Saturday, the 4th of May, at the Society's House, the card for which will admit the Member only; the second on Saturday, the 1st June, at the South Kensington Museum, the card for which will admit the Member and two ladies, or one gentleman.

Cards for both these Conversazioni have been issued. Any member not having received them should communicate with the Secretary.

Secretaries of Institutions in Union, who may receive applications from any of their members desirous to attend either of these Conversazioni, can have a limited number of cards placed at their disposal on application to the Secretary of the Society of Arts.

THIRTEENTH ANNUAL EXHIBITION OF INVENTIONS.

The Exhibition was opened on Monday, the 1st of April, will remain open every day until further notice from 10 a.m. to 4 p.m., and is free to members and their friends. Members by ticket, or by written order, having their signature, may admit any number of persons. Members of Institutions in Union with the Society are admitted on showing their cards of membership.

NINETEENTH ORDINARY MEETING.

Wednesday, April 24, 1861.

The Nineteenth Ordinary Meeting of the One Hundred and Seventh Session was held on Wednesday, the 24th inst., Sir Thomas Phillips, F.G.S., Chairman of the Council, in the chair.

The following gentlemen were proposed for election as members of the Society:—

Baker, John	16, Brunswick-sq., Brighton.
Beddoe, William	4, Honey-lane, Cheapside, E.C.
Campbell, R. J. R.	62, Moorgate-street, E.C.
Carter, William	Ebbw Vale Co., 7, Lawrence Pountney-hill, E.C.
Clarke, David Ross	31, New Broad-street, E.C.
Douglas, John D.	166, Fenchurch-street, E.C.
Edmondson, John B.	3, Broughton-terrace, Great Clowes-street, Manchester.
Fernie, Ebenezer Waugh	Highfield, Berkhampstead.
Fletcher, Joseph	Whitehaven.
Fox, Edwin	4, Cullum-street, E.C.
Hancock, Frederick Wm.	4, Adams-court, Old Broad-street, E.C.
Jewesbury, H. W.	2, Mincing-lane, E.C.
Jones, William Charles Hussey	Leeswood Green Collieries, near Mold.
Montgomerie, Hugh Edmondstone	17, Gracechurch-street, E.C.
Palmer, Edward Howley	11, King's Arms-yard, E.C.
Pearce, William	Springfield, near Poole, Dorset.
Pellas, C. A.	42, St. Mary Axe, E.C.
Reed, Richard Kingsford	110, Grange-road, Bermondsey, S.E.
Richardson, F.	7, Mincing-lane, E.C.
Rimington, Alexander	Frognalls, Hampstead, N.W.
Socher, F. A. de	28, Clement's-lane, Lombard-street, E.C.
Sparks, William S.	28, Conduit-street, Hanover-square, W.
Thorne, Augustus	4, Cullum-street, E.C.
Thurburn, Robert	5, Crosby-square, E.C.
Tomlins, P. N.	Painters' Hall, Little Trinity-lane, Cannon-street, E.C.
Twentyman, Alfred G.	Tettenhall, near Wolverhampton.
Ward, John	5 & 6, Leicester-square, W.C.
Watson, J. Y.	Effra-house, Brixton, S.

The following candidates were balloted for and duly elected members of the Society:—

Graham, John, M.D.	15, Gloucester-road, Regent's-park, N.W.
Harris, Josiah	Ess-hill-house, Newton Abbot, Devon.
Hooton, Jonathan	80, Great Ducie-street, Manchester.
Londonderry, Marquis of	37, Grosvenor-square, W.
Lutwidge, Robert Wilfred Skeffington	19, Whitehall-place, S.W.
Nugent, E.	Commercial College, Brooklyn, New York, U.S.A.
Salmon, Henry Curwen	36, Lemon-street, Truro.
Sharples, Joseph	Hitchin.
Thackrah, James Henry	10, Villiers-street, Halifax.
Wadham, Edward	Millwood, Furness Abbey, near Ulverston.
Weild, William	Atlas Works, Manchester.
West, J. G.	92 and 93, Fleet-street, E.C.
Whitehead, R. Kay	Walshaw-hall, Bury.

The Paper read was—

COLOR ON STATUES, COLOR ROUND STATUES, AND PAINTINGS AND SCULPTURE ARRANGED TOGETHER.

By John Bell, Sculptor.

Color on Statues.

In March of the year before last, the subject of coloring statues was brought before the notice of this Society in a

paper read in this room by Professor Westmacott. This paper went carefully over a large portion of the subject. It treated of the degree in which there were evidences of the old Greek sculptors having added color to their statues. It also argued the subject, whether or no this was an improvement to sculpture. It also registered the professor's valuable opinion that it was not. The Dean of St. Paul's presided, and gave the weight of his learning and testimony to the view that there was no proof of the Greek statues having been colored, except when forming parts of architecture. Professor Donaldson and Mr. Crace however, who took part in the discussion, inclined to the coloring of statues.

Even with the chance thereby of leaving my argument incomplete, I would avoid recapitulating what passed; all which also is to be found duly reported in the Society's *Journal* for March 2nd, 1859. In what follows, indeed, I wish, as much as possible, to avoid going over the same ground, content rather to supplement than to cover the whole subject. My remarks therefore, will be chiefly addressed to considering firstly, with what object the Greeks colored their statues, when they did do so—which was by no means their constant practice—and secondly, to submit the only way in which I conceive that color can be suitably associated with statues at the present day: thirdly, with a few words as respects the joint exhibition of paintings and sculpture (as being part of the subject of color associated with statues), these notes will conclude.

In order, however, to attach them to Mr. Westmacott's address, I must go back a little to make them overlap and unite, but will repeat as little as possible.

On the occasion I speak of, the Dean of St. Paul's remarked that there was a passage in Plato which was a stronghold of Mr. Westmacott's antagonists, to which however the professor had not alluded. With your leave I will quote this now, it is from "Plato de Repub." lib. iv., and is contained in a rejoinder of Socrates. We may remark, by the way, as this gives more authority to the point of the passage, that this revered Greek philosopher was not only the son of a sculptor, but for some time himself wrought at the profession. This is the passage: Socrates speaks—"Just as if "he says," when painting statues, a person should blame us for not placing the most beautiful colors on the most beautiful parts of the figure—inasmuch as the eyes, the most beautiful parts, are not painted purple but black; we should answer him by saying, clever fellow, do not suppose we are to paint eyes so beautiful that they should not appear to be eyes." This passage, we may well admit, alludes to the painting of statues: The word for statue being "Andrias." But it does not say that the flesh was painted, nor that these were marble statues which were so treated. We ourselves, in our towns, possess painted statues of wood, as in those of that distinguished North Briton, of which we still remark images in some of our old snuff-shops! The Greeks also, as Pausanias informs us, had in their gardens and groves figures of plaster and wood which were painted. By this people, however, without doubt, many statues were painted of a much higher order than these, and even occasionally those of their gods.

Another remarkable passage from the ancient authors, brought to bear on this subject by the polychromists, is that from Pliny (Book xxxv. cap. 2), in which he says, (speaking of Nicias the encaustic painter) that Praxiteles, the great Athenian sculptor, when asked which of his marble works best satisfied him, replied "Those which Nicias has had under his hands." "So much," says Pliny, "did he prize the finishing of Nicias." *Tantum circumlitioni ejus tribuebat.* Now, the whole force of this passage turns upon the meaning of the word *circumlitio.* In the dictionary this word is translated "polishing" as indeeds its derivation points out. But the polychromists say that Praxiteles could not have meant polishing. Nicias, they say, was an encaustic painter, *i.e.* one who painted in wax, laid on with heat, and that therefore *circumlitio* must have meant painting the statues in encaustic! This, you see, however, contains no evidence, and may be taken as an example of what is called "begging the question." A little circuit perhaps may bring us round to a truer explanation of the passage. At times of festivity the Greeks delighted to oil their bodies, as did the Romans also, a somewhat barbarian practice, as it seems to us now, but so they did. To give a similar shine and gloss to their statues, they occasionally waxed them, as the Romans did also. Nicias, as no doubt he used the best wax for his pictures, may probably have superintended this process for such of Praxiteles' statues as that sculptor prized the most; and there ends the whole story, for not a word is said about color in it. Moreover, the question put to Praxiteles was rather a searching one,—"which of your statues do you like the best?" Also a direct answer might have given offence in some quarters. Thus, however, did he parry it gracefully, by saying "Those which Nicias has had under his hands."

The whole misapplication of this passage seems to arise, not from what Praxiteles himself said, but from what Pliny has volunteered "*Tantum circumlitioni ejus tribuebat,*" "so much did he attribute" or ascribe "to the polishing of Nicias." The truth is, that it was a pretty *ad captandum* speech—just such as one as Pliny loved to record, and as such has been handed down with a force and meaning attached to it to which examination shows it has no claim.

In the two quotations I have made exist the principal strongholds of the statue-polychromists, as regards ancient authority of this kind in evidence of Greek practice. Having given precedence to these, I will now proceed to mention one or two on the other side of the question.

In the discussion after the paper here on the occasion I have referred to, the Dean of St. Paul's brought forward a valuable, and to me, a new passage, bearing on the subject, namely, one that occurs in line 406 of the Agamemnon of Æschylus, in which Iphigenia, when about to be sacrificed, is compared to a statue "from the want of life or speculation in her eyes." "This simile," the Dean justly remarked, "would not have been used if the eyes of statues had usually been colored."

Now however, I would return to the practice of Praxiteles, so much advanced by the statue-polychromists. In support of Mr. Westmacott's views on the occasion I have mentioned, in the course of the discussion I alluded briefly to the following illustration, which now however I will give a little more in detail, in the following story. In the Egean Sea, not far removed from each other are two islands; the island of Cos, and the island of Cnidos. The inhabitants of the former island—that of Cos—desired to have a statue of Venus in the finest marble, and they commissioned Praxiteles to execute it. Anxious to give satisfaction, the sculptor, in response, made, not one statue, but two, of this divinity, one nude, the other draped. Having done so he gave his employers their choice. The inhabitants of Cos selected the draped version. Perhaps there was an Art Committee on the occasion, for, as it appears, they did not choose the best! At least, the other one, afterwards purchased by the inhabitants of the neighbouring island of Cnidos, became eventually by far the most celebrated of the two. At that time, some 300 or 400 years before our Saviour, pretty nearly every island in the Egean had its celebrated statue of its tutelar divinity; but this Cnidian Venus was by far the most celebrated of all. It was however, but life-size, was in Parian marble, and was no doubt exquisitely conceived and worked. A small temple was built for it, in the midst of a beautiful garden. The temple was open on all sides, so that it could be seen in all views. The Cnidians valued it beyond all their possessions. The regard for it was not limited to them, however; Nicomedes, King of Bithynia, a neighbouring state, having offered to remit a very large public debt which the Cnidians had contracted with him, if he might become the possessor of it; but the offer was declined. Moreover, it was not merely "the cynosure of neighbouring eyes," but strangers came from all parts of

the world to see it. "Many persons," says Pliny, whom I have been quoting *passim*, "sailed to Cnidos with no other object but to gaze on this statue." "It was," he adds "not only the finest statue of Praxiteles, but the finest statue in the world."

Now was this statue painted? Not a bit of it. At least, not a word is mentioned of color or tint in all Pliny's account of it, or in the still more detailed one by Lucian. Is it to be supposed that if the eyes, for instance, had been painted blue or brown, or the hair dark or fair, that neither of these two authorities would have made the slightest allusion to it? Pliny says, that in every point of of view this statue was beautiful, and that visitors remarked that whichever way they approached her, "the goddess smiled benignantly upon them." Also Lucian, in his *De Amore*, Division 13 vol. v. tells us that the mouth was a little open and somewhat smiling. In another part he expatiates on the beauty of the hair and forehead and admires the precise yet delicate eyebrows; but not a word about the color of the hair and eyebrows. He then makes special mention of the swimming softness of the eyes, but not a word about their hue, which surely he would have mentioned had they been tinged, however slightly. The position of one hand of this statue was similar to that of the Venus de Medicis, as we see by some coins of Cnidos containing representations of her, for, alas! the statue itself no longer exists, having been taken away to Rome, and thence eventually to Constantinople, where it is said to have perished by fire. The other hand held a pendant of drapery, that fell over a vase, but there is no mention of color on either of these accessories.

But the part of the evidence which is yet to come is far the most important, as it has direct reference to the surface of the undraped portions of the figure having been left untouched by color. "This statue," Lucian adds, "was of Parian marble, and had a blemish, or stain on the left thigh was the more remarkable on account of the extraordinary brilliancy, "*Λαμπροτης*" or "splendor" of the marble. This is the peculiar characteristic of Parian marble (far more beautiful than the Luna or Carrara marble we now use), and it illustrates that its native surface and hue were untouched. There is a very fine specimen of Parian marble in the British Museum of a hand holding a butterfly, probably that of a Psyche, in this marble. There is an exquisite creamy glowworm-like look about this marble, that is most charming. It has just the degree of transparency of young flesh itself, and possesses, as it were, a native semi-lucency of its own, like that of the milky-way, or of a summer sea.

Let us, however, look to the further pertinence of Lucian's description. There was a stain on the marble, he says, but adds that the effect of this was only like that of a foil which rendered the brilliancy of the rest of the marble more remarkable. Now, however much this fancied foil, but real blemish, was converted into an additional charm by the lover-like attachment and consequent special pleading of the admirers of this cherished work, you may be sure that the sculptor himself, when he made it, was not of this way of thinking. Solicitous, as we sculptors are, to obtain the purest and most spotless marble, especially for this class of work, we may be quite sure that Praxiteles would have been very glad, if he could, to have concealed the blemish in question, and that if his friend Nicias had really been in the habit of coloring his statues, it was on an occasion like this that his services would have been especially in requisition.

Painted, therefore, as regards the flesh, certainly it appears that this *chef-d'œuvre* of ancient art was not, or the blemish in question would have been the first thing to have been concealed. Neither could it have been stained, both because there is no mention of this, but also the word *λαμπροτης* is conclusive on this point. Also, I would submit that it were as vain to paint the lily, or gild refined gold, or varnish a diamond, as to attempt to add to the poetry of pure Parian marble by any color enhancement whatever.

When also this remarkable instance of the non-coloring of this *chef-d'œuvre* of ancient art is brought to bear upon the general practice of those times, in respect to coloring marble statues, the evidence afforded by the passages I have quoted is the stronger, just because it is negative. Had Pliny or Lucian felt called on to say that the Venus of Cnidos was not painted or stained, it might have been argued that she was an exception to a rule that otherwise prevailed; but not a word appears on this subject. Instead of this, both writers treat the matter just as we should now, or at any other time when the painting of marble statues has been, as now, not the general practice. There are various other points which, having been gone into before, I avoid repeating, and I rather look to upholding my views by contrasting two, as it has happened, on each side, of the principal passages on this subject, than by an elaborate array of various authorities. Nevertheless, I am prepared to allow that Archaic and Eginætan sculpture may have been frequently treated with direct color, both from the force of old precedent, and from each art, painting and sculpture, not having been originally sufficiently advanced to go alone. But assuredly I do not believe, as indeed there is no proof, that in the best times of Greek art independent marble statues were ever painted, nor indeed any highly wrought statues at all painted, except for purposes of idolatry. And this brings me at once to the proposition I have to put before you. It is this—that the ancient Greek statues were only painted when they were idols, and when they were intended to be worshipped; and thus when these statues were painted, in Greece, that it was priest-craft, and not art-craft that painted them.

Having now laid this distinct proposition before you, for you to consider whether it is right or wrong, I will proceed more in detail. Doubtless, there were many ancient Greek statues, that at any rate, were not monochrome, but on the other hand, of various colors, and in many cases, I believe, painted up to full tints. These, however, were not, I conceive, usually in marble, but their chief examples come under the head of the Cruseo-elephantine art of the Greeks used in the temples. These Greeks, like the Egyptians, made gigantic statues of their gods, Jupiter, Juno, Minerva, Apollo, &c., not, however, in granite, but sometimes in marble. Usually, however, these very large figures were made in metal, either cast or beaten work, or in ivory and gold, that is, with a surface of thin veneers of ivory and plates of gold laid over a framework of wood, so fashioned as just to allow their thickness to make up the substance, form, and surface acquired. This seems, no doubt, a strange patchwork way of making up a god, like a piece of upholstery, and vastly inferior in dignity to hewing him out of granite or marble; and indeed, had we not reliable data for the practice, we could hardly have believed that such a people as the Greeks would have so wrought. However as my audience are not perhaps conversant with Quatremère de Quincy's or Müller's account of these proceedings, I will give a few sentences on the subject drawn from what they say. First, I would premise that these cruseo-elephantine, or gold and ivory statues, were not uncommon in Greece and the Grecian islands, and indeed that it was a received way of making a god in those days, and that moreover they were not unfrequently of great size. The Jupiter of Elis, although seated, was 60 feet high; and the Minerva of the Parthenon, standing 40 feet. Both of these were by Phidias. Among various other large examples of this art were the Juno of Argos, by Polycletus; the Esculapius at Epidauras, by Thasymedes; and the "Great Goddesses" at Megalopolis, by Damaphoon.

The first thing to be done in making these giant works, after the model was prepared, was to put together a great framework of wood as a core, yet hollow within, so that the workmen could get inside to adjust the work, and rivet the veneers of ivory and gold which were to form the surface; and no doubt for convenience, they had stages and stair-cases within these great statues, the wooden framework of which was, as Müller informs us, strengthened

across with rods of metal. But he shall speak for himself. In division 312 of his elaborate work on ancient art, this author thus informs us: "The ancients received from India, but especially from Africa, elephant's teeth of considerable size, by the splitting and bending of which, 'a lost art' but one which certainly existed in antiquity, they could obtain plates of ivory from 12 to 20 inches in breadth." I may here be allowed to remark that in the Exhibition of 1851, this "lost art," so called by Müller, seemed to have been revived and carried even further than by the Greeks. A prize medal on that occasion was awarded to Messrs. J. Pratt and Co., Meridan, Connecticut, United States, for specimens of ivory veneers cut by machinery. "These veneers were exceedingly delicate"—I am quoting the official report—"one piece alone being 12 inches in breadth and 40 feet in length, and having been sawn from a single tusk." Perhaps some of those present may remember this remarkable example of the ingenuity of our brothers over the water, pendent spirally, like a great carpenter's shaving. But to return to these great Greek statues. "In executing one of these," says Müller, "after the surface of the model was distributed in such a way as could best be reproduced in these plates, the individual portions were accurately represented by sawing, planing, and filing the ivory, and afterwards joined together, especially by the use of isinglass over a kernel of wood and metal rods. The holding together, however," he adds "of the pieces required incessant care;" as indeed we may well conceive, as ivory is apt to expand, and contract, and warp, and curl, in changes of moisture and temperature. Indeed it must be acknowledged that the whole process and sham nature of the work thus described, impresses us with want of dignity, lack of permanence, and the necessity of repair. From a passage in Valerius Maximus, it appears that Phidias desired to make this figure of Minerva for the Parthenon, not after this fashion, but in marble, but he was overruled. Had the sculptor had his way, we should probably have had now existing some grand and noble remains of it, in addition to those invaluable fragments of some of the subordinate statues which we possess in the British Museum. But the priests had their will. Idolatry had its way instead of art, and in consequence—oh, just retribution—not a pinch of dust remains of their daughter of Jove. Now, *cæteris paribus*, the priests must, we may suppose, have desired permanence for their god, and must have been well aware that this upholstery-manufacture mode of making it was not likely to last like marble. Also, this mode could not have been selected, as has been suggested, merely because of its superior costliness, because the introduction to a greater degree of gems with the gold, as was sometimes done, would easily have made the marble work as costly as, or more so, than the ivory. Also, the untouched surface of ivory is by no means more beautiful as a representation of flesh than marble, much less so indeed as regards permanence, as it gets yellow and discolored. But then, on the other hand, it is highly suitable for receiving the most delicate and pure tints. It is therefore much used by miniature painters. Most of the beautiful works exhibited last year in this room, of the late Sir William Ross, were painted on this material. It is probable, however, that the ivory surfaces of these colossal statues were rather stained than painted; and ivory takes these stains evenly and with facility, which marble does not. The examples, indeed, which I have seen of coloring marble, especially with tinted wax, have been singularly unfortunate. Marble is apt to be unequal in its grain, and takes the coloring matter capriciously. In the imitation of flesh, a greasy, unpleasant effect is the result, and where the grain of the marble shows coarsely, what is vulgarly called a "goose flesh" appearance is produced, which is certainly neither agreeable nor divine.

Doubtless the Greeks imaged that their gods had pure complexions as well as beautiful features. The Empyrean airs of heaven might well be supposed to imbue these with an exquisite delicacy not to be imitated by the permanent treatment of any surface less capable of refined tints than ivory. I am well aware that in the few last sentences I have been hazarding a somewhat novel theory, in this special reason I have submitted for the use of ivory in the colossal idol art of the Greeks, but pray accept that I do not do this dogmatically, but only for discussion.

Even however, in entertaining this view of these great statues of the presiding genii of the Greek temples having been thus surfaced with ivory for the purpose of being colored up to a refined version of the tints of nature, we must not be under the impression that they had a common vulgar effect, like that of wax figures, for which we have an instinctive repugnance. This indeed, would have defeated the very object which the priests had in view, that of impressing the multitude. Indeed, in as far as it could work at such a disadvantage, no doubt the exquisite taste of the Greeks was also applied to the finish of these works. The Minerva of the Parthenon was no mere sham of a great woman, but in the hands of Phidias was a bold, though a coerced attempt to realize the tutelar divinity of Athens, the immortal virgin of Wisdom, a being solemn and impassive, far above the human level, and through whose veins coursed, not blood, but celestial ichor.

Dramatic effect in their worship was ever sought by the Greeks, and it was only at special times that their divinities were unveiled at all to the general people. On such occasions every means was taken to work upon the senses. Colored curtains tinted the light, ceremony lent its impression, and music and the chant their charm. Censers filled the air with their ambrosial vapor, and sacrificial clouds waved before the divinity, like those of his own imaginary heaven, from behind which, to the entranced votary, well might the mystic god, almost or quite, seem to breathe, frown, or smile.

This was "a consummation devoutly to be wished" by the priests, for then the fame of their god increased, and offerings flowed in to their treasury. To effect impressions like these, doubtless was it that these great statues were painted up to a key of divine life, which assuredly could not have been reached by the mere natural tints of ivory and gold. It was to accomplish this, that the powers of such as Phidias were thus coerced, and it was under all these devices that these magnificent idols were manufactured in those old days as the agents of Polytheism and superstition.

Whenever, also, the statue of the god himself, in the penetralia of his own marble house, was thus treated with the hues of life, doubtless its own immediate subordinates around, especially within the building, had in some degree to wear his livery. Also when polychromy spread in addition over the exterior architecture, harmony dictated that some variation of color should be connected also with the outside sculpture, as especially in the backgrounds of the tympana, metopes, and friezes. As regards, however, the statues themselves in these situations, the variety of tint was probably confined to that obtained by difference of material, as in shields, swords, helmets, and bridles of metal, and not by added surface color requiring constant and extensive repairs not capable of being done in secret, as was the case with the interior figures.

Thus do I conceive that the Greeks did color some of their statues, and that they did so in different degrees, which, however, may be divided into two general styles of execution. One was the painting or staining them more or less to imitate reality, for the higher classes of which work it was, I conceive, that ivory was used, as in the great gods of the temples. The second was the obtaining of variety of color by difference of material. The former of these treatments can only, I conceive, find its excuse, if excuse it may be called, in the idolatry of the time. The second partakes of the character of Mosaic work, and is perhaps less objectionable in principle, but as an art it is assuredly more curious than beautiful, as may be remarked of several late experiments in this direction by our neighbours the French.

While, however, it may be readily acknowledged that

Greek artists, coerced by Polytheism and superstition, did occasionally color some of their most prized works, yet on the other hand with respect to the highest class of their independent marble statues, it is equally evident that they were left untouched in this respect, as we have seen was the case with that most cherished work of them all, "The Venus of Cnidos."

I would thus submit that Greek art-craft made beautiful statues—uncolored—as works of art and left them so —and that it was Greek priestcraft that made them colored—as idols—and as engines of state religion. This is a broad distinction—as such, I venture to submit it to you as a clue to what I readily acknowledge to have been the varied character of old Greek practice in this respect.

We will now proceed to later times. Here the reflection obtrudes itself on us that even now we meet occasionally with colored statues which savour of superstition, and I would avoid this phase of the subject, and as regards modern times, restrict myself solely to the art-craft of the question.

In the renaissance, or revival of the arts in Europe, we hear nothing of coloring marble statues. In the time of the learned Leonardo de Vinci, Michael Angelo, Raffaelle, John of Bologna, and others great in art, we find no instance of marble statues having been colored. Michael Angelo, who was so remarkable for the union in his one person of all the arts, being at the same time an admirable architect, painter, sculptor, and decorator, never attempted to color his marble statues. It is true that coloring was afterwards applied to statues and relievi, even of considerable size, by Luca della Robbia and others; but these works were not in marble, but in porcelain, and more subordinate than any fine work of sculpture can ever be, however harmonious with the situation in which it is placed. The marble Moses, for the tomb of Julius, and the wonderful groups of the Medici monuments, have come down to us in their native monochrome, untouched by change of tint, except such as time has supplied. Michael Angelo, that representative in one of all the arts of his time, did not mingle in one object the two arts, nor does it appear that in the more important works of the Cinque Cento marble statues were ever colored; nor, great as was the attention given to the works of ancient sculpture that at this period were, from time to time, discovered among the ruins of Italian towns, especially in that of ancient Rome, does it appear that these great masters ever contemplated the idea that such works were ever colored. It appears, therefore, improbable that any remains of color were found on the Apollo, the Venus, the Laocoon, or other celebrated works when first exhumed, nor does any color seem to have been found on the statues in Herculaneum and Pompeii, although the colors on the walls of the apartments in which they were discovered were still fresh and vivid. Thus, neither in Ancient nor Modern Italy does there appear any proof of the prevalence at any time of the coloring of independent marble statues, any more than in Greece.

Having thus set forth my view as to the practice of the ancient Greeks in this respect, namely that they did not color their statues except for purposes of idolatry, for which reason we find this treatment only connected with their temple architecture, and that not always, we naturally come to the consideration as to whether we now should color our statues? At any rate, in these isles we are not idolators. Our Church is not one of idolatry, and therefore we have not, as I have said before, that excuse, such as it is, for coloring statues that the Pagans had.

Quitting, however, for a moment this vantage ground, let us consider the matter merely as an art question.

Let us first consider, is the addition of coloring to statues to be looked upon as an advance in art, or a retrogression? The polychromists will, of course, hold it to be the former, while the monochromist in sculpture will represent that it is rather a confusion of those arts which good taste has gradually separated, in the progress of civilisation, into distinct languages of human expression. The polychromist will claim honour for uniting the charms of color with those of form, as the evidence of advance and improvement, while the monochromist will point with a significant finger to the earliest efforts of art, when the arts of form and color, each barely sufficient in itself even to suggest an animal, a man, or a god, were obliged to club their means to produce anything like a clear result.

We are not without illustrations of this even now, in our most inferior specimens of pottery sold about the country to cottagers by the "Cheap Johns," in crude little images of children, dogs, and parrots, &c., of which the form is so incomplete that the intention could hardly be recognised but for the aid of colour.

In primæval times, the first thing that men attempted in art was probably in the way of hero worship, in the making of images of their ancestors, or of great tyrants, as a sort of guardians to their houses, and to be prayed to and propitiated in the chace or war. The more living these could be made to look by the artist's hand, and the more ferocious, the more effective, no doubt, was deemed their mystic power, and hence from these beginnings arose that evil feature that has played so large and lamentable a part in the history of man—the idol.

This form of superstition we have, I trust, thrown off for ever, except in a region in which I have no doubt we shall all allow there is no objection to it—in the nursery—where it appears with but little change of name—in the form of the doll. Doll is only an abbreviation of idol. It is an infantine abbreviation. It is the way a little child would strive to say idol. In the original Greek the word is Ειδωλον; in the Latin, *Idolum*; in the English, idol; and in the nursery, doll. You may recognise readily that these little images are, to all effects and purposes, colored statues. Also, we may say that in the nursery they are to a great degree worshipped, especially when they are new. A new doll is to a certain degree a divinity for the time being. However, these kinds of idols are no longer "ferocious." On the contrary, they are produced as pretty as wax and carmine and silken tresses can make them. They even open and shut their eyes, which is an advance even beyond the cruseo-elephantine statues of the ancients. At least, I have no recollection of any record of winking divinities in those days. We can have no objection to the harmless and interesting idolatry of the nursery towards these little images. There is nothing that breaks any commandment in that. I would here remark that these little figures possess one great advantage over any colored marble statues that I have seen, viz., in having eyelashes. The want of these natural and beautiful fringes to the eye in such colored marble statues as I have seen is very unpleasing. Of course, in a pure marble statue you do not feel this, but when colored the want is sadly apparent, and I do not see how it can be got over. There are some evidences of bronze eyelashes having been added in some of the ancient works, but the effect of these could not be very happy, one would think. The children's favourites are more fortunate in this respect. Pray do not conceive that I introduce these nursery statuettes in any way for the purpose of throwing ridicule upon the subject of colored statues, but only as an illustration of the sole phase of the "colored statue" which I conceive to be at the present time legitimate as a matter of art or regard.

However, I must not let this happier phase of the idol draw me away from our view of the original type, or from the broad consideration I desire to illustrate, namely, that all barbarians and idolators have been and are more or less polychromists as regards the art of sculpture. They have all colored, and, while they remain barbarians and idolators, will continue to color, their statues.

I conceive, therefore, that in these civilised days, the coloring of statues is not an advance, but a palpable retrogression towards earlier times of less intelligence, and of a lower dispensation, and, moreover, as far as art is concerned, that a decadence would at once ensue on a general adoption of such a practice. A colored statue or bust now and then

can do no harm, perhaps rather good, as they may serve to show they will not do. But there is a great deal of fashion in art. Fashion is often very unreasonable, and if a fashion were to set in for idols instead of statues, I believe it would do for the time a deal of mischief. Moreover, as a matter of sense and probability, is it possible to consider that the uncolored statues of the Venus of Cnidos, and of the Moses, and Night and Morning, of Michael Angelo, and the noble works of Thorwaldsen and Flaxman are but incomplete steps, half-way as it were (and as having left the true track of the arts) between the first struggling idolatrous attempts when images were all painted—and a more advanced and perfect period, forsooth, when the same barbaric principles are to be reproduced and practised?

Color Round Statues.

While, however, for the above reasons, I am opposed to placing various colors on a statue, especially a marble one, I have no idea of underrating the value of color in connection with statues. On the contrary, I am sure that this subject of the association of various treatments of color with statues has not received nearly the study and attention it deserves. My difference with the statue polychromists is not that I do not desire color and statues together. In that we both agree that it should be so. Our difference only exists in the mode in which this should be done; they desiring to place color on the statue itself, so as to make it harmonise with the surrounding objects, while I submit that this harmony is to be effected far better by other means, namely, by arranging such colors around the statue as require the natural, pure, creamy, semi-transparent, local tint of the marble to complete the composition of color. And the same, *mutatis mutandis*, may be said of statues in bronze, which is indeed a quality of color frequent in the finest paintings, as in those of Titian and Giorgione, and in the landscapes of Gaspar Poussin, and our own Wilson, Crome, and Turner. It is thus I conceive that the picture should be made up, with the statue as the eye of the composition, and that the surface of the statue itself should not be deteriorated by any color treatment, which, if once commenced, you know not where to stop, and which, if treated up to the full color of flesh, only makes the statue look like a wax image.

I do not attempt to enter now on the treatment of color with statues in edifices of which they form an illustrative and integral part. That were a very wide field indeed, including the whole subject of architecture, painting, sculpture and decoration, and their relation; enough, indeed, for several addresses. On the present occasion I limit myself to that part of the subject alone which attaches to the treatment of color with statues in art exhibitions, under such arrangements as are practicable on such occasions. A few weeks ago I touched briefly on this subject, in some notes I read at the Department of Art, Kensington, entitled the Four Sisters; but, perhaps you will permit me now, for a few minutes, to go into more detail. The more so, inasmuch as I submit that the inadequate treatment of color, in connection with sculpture, has hitherto formed an important item in the shortcomings of our current exhibitions of this art.

The situations in which, round a statue, color presents itself, are below it, behind it, and above it; on the floor, the back-ground and the ceiling. Of these, of course, the back-ground is the most important to the statue, as it is that against which it is seen and which contrasts immediately with its outline. Now it has been the prevailing custom, at least till quite of late years, to make this contrast a very strong one, and for this purpose a very strong dark red has been the favourite color, as at the Royal Academy. I conceive this to be an error, and, as far as I have been able to influence decisions on the subject, I have done my best to introduce a change. On being called on, at the time of the great Exhibition of 1851 in Hyde-park, to arrange the British Sculpture there, I made it a stipulation that I should be allowed to depart from the violent red used and proposed up to that time as a back-ground for statues, and to select a modified tint. Again, in 1855, being employed with Mr. Redgrave, by the Board of Trade, to arrange the British Sculpture in the International Exhibition in Paris, I used the same color, which, however, on that occasion was seen under every disadvantage, from the darkness of the room allotted to that purpose.

Since this, a similar tint has been adopted in the Exhibition of British Sculpture at South Kensington.

Also it has been partially used in the Crystal Palace at Sydenham, as a background for some of the ancient statues, and I believe that portion is best liked. Thus it may be said, I think, that this treatment of tint has been to some degree endorsed by experience. This color is not in a violent key, but a mild one, being a middle tint, a warm grey, not too dark or sombre. This, while it affords a sufficient relief for the outlines of the figures placed before it, more, however, from its atmospheric character and quality of retreating from the eye than from its direct contrast, softens the outlines agreeably, and makes the forms before it look round and fleshy.

If you notice the effect of flesh in nature, you will find the outlines never harshly projecting from the back-ground, and in fine paintings acccordingly you perceive this natural softness imitated. If we desire, therefore, by a background, to gain the same agreeable appearance in statues, why should we not use similar means, viz., by a softening of the outline? If the back-ground is such that the edges of the statue melt into it, then the statue looks round and like nature. But if, on the other hand, the back-ground asserts itself too much and tumbles forward, as a strong red is apt to do, instead of retreating, like grey, and is, moreover, harsh and violent in its contrasts, then the outlines of the statue all round are thrown out upon you and the figure looks flat, harsh, and unnatural. You know how inferior is the appearance of a plaster statue to that of one in marble, greatly from the opacity, and therefore, harsh edges of the one and the semi-transparency and comparatively soft edges, like those of flesh, of the other. As a consequence, by a harsh treatment of back-ground, you may thus make a marble statue look like a plaster one. While, on the other hand, by a suitable tender back-ground of sufficient contrast and of a retreating atmospheric character, you may make a plaster statue look almost like a marble one. For this purpose delicate mixed tints are more appropriate than any more positive. However, pray do not conceive that I think this individual warm grey the only color suitable for the back-ground of statues. By no means is this the case, and I only put it forward as one example of the class of colors, and not the sole color, suitable for this purpose. The material, however, in which these are presented is also important. Texture is important as well as tint. In these cases no material perhaps, is more favourable for the back-ground than drapery of some unglazed material arranged, not rigidly, but in easy folds, whereby it affords a more natural adjunct to the statue before it; its lines being adjusted so as to compose with the lines and masses of the statue, thereby advantaging its effect.

Let us suppose the drapery, woollen, of some simple, rich texture, and graceful fall, and of some tender atmospheric tint, and let it be suspended along a wall space to be occupied in front by a few statues. Let the drapery hang comparatively plain immediately behind each statue, but in the intervals between, be gathered somewhat together, so as to form columnar perpendicular folds. Thus is a semi-architectural effect attained without rigidity, in which plain panels are simulated behind the statues and columns between them. The result of this is pleasantly regular and yet gracefully varied, and is capable of the most easy adaption to the various breadths and scales of statues or groups placed before it, and also to any changes of their places which may occur in the course of arrangement. Taking this as an example of the principle of arranging drapery as a back-ground to statues, it may be recognised as capable of practice in so

many ways, in simulation of forms of architecture, as to suit it to the exhibition of any kinds or classes of sculpture. No doubt, when a statue is composed especially for some express architectural space in a building, it ought to look best there, associated with the actual architecture for which it is designed; but in exhibitions where the placing of statues is comparatively unrehearsed, statues will probably harmonize better with drapery accompaniments than with more rigid and precise forms in relation to which they have not been originally composed, and in which congruity is difficult if not impossible.

This also is a semi-pictorial treatment of sculpture, inasmuch as thereby a varying artificial atmospheric back-ground is formed and composed behind each statue as a simulation of nature's sky and clouds behind a portrait or figure in a picture, whereby the principal object is enhanced. On several occasions I have suggested this mode of enhancing statues by ample drapery backgrounds, and on more than one, only considerations of expense have prevented its being adopted. It will be recognised that a mere flat tint, distempered or painted on the wall, is not calculated to give much idea of the effect of the same tint presented with the variety and grace of drapery, and therefore it were prejudicial to judge of the ultimate effect of drapery except by drapery itself. In the Louvre, behind the famous fragment of the Venus of Melos, drapery has been hung with excellent effect, and seats are placed at the best points to view it from, a mode which, in a gallery of exhibition, has many advantages. But the back-ground is not the sole consideration. Supposing in a statue gallery a warm grey has been adopted for the back-ground, and the creamy white statue stands before it, we have then to complete, by the choice of tints for the other parts, the composition of color. With this starting point of warm grey for the background, I believe that the pedestal of the statue might well be covered with cotton velvet of a deep bronze green. The floor on which it rests might then be stained deep red and black, of a mosaic character, as seen in encaustic tiles. The ceilings might then receive some light delicate retreating atmospheric color, with a little yellow introduced, which were best done by light gilding. This is one key of tint for the arrangement of light colored statues, which will rarely, I believe, disappoint the eye. Perhaps it is sufficient as an illustration of the principle I advocate.

In cases where statues are darkened and embrowned by time, a different key altogether may be required. This, however, is the reason which I have received for the intense, and almost furnace-like color placed behind some of the darker works in the British Museum.

The whole question, however, of the effects of statues with color, presupposes a good light, namely, for most statues, at an angle of 45 degrees, or thereabouts, falling on them from above. Recumbent statues are more favoured by a lower light, slanting down so as to show the features.

Colored lights, as in the Napoleon tomb in the Hotel des Invalides, in the Princess Charlotte's tomb in the Chapel at Windsor, or in the Ariadne room at Frankfort, may not appear consistent with the dignity of art. In the case, however, of their being admitted as an aid to effect, as probably was the case in the Greek temples, all the other adjustments of color might have to be reconsidered. In these remarks I only contemplate uncolored light.

As regards bronze statues, a positive key cannot so well be given, as their tints are various, extending from dark Florentine bronze to the light golden browns of Paris. However, as a general suggestion, it may be remarked that a golden green is usually an harmonious background for a bronze statue. A polished black marble pedestal also is effective in taking the dark out of the bronze which stands on it, lighting up its shadows by contrast. In the absence of black marble, a covering of black velvet affords an agreeable substitute. In the immediate neighbourhood, vigorous warm colours may come in agreeably, as a Turkey carpet on the floor, and hangings around of rich velvet, looped up with gold cords.

As a general rule, perhaps it may be said that tender colors in the backgrounds harmonise best with marble statues, and full colors with bronze, as we see the dark races the most attached to brilliant and powerful tints. With marble statues delicate greens, azures, and purple grays, citrons, lilacs and chocolates supply charming backgrounds, the effect of the composition of color being, of course, supplied by the other adjuncts. It may, however, be held generally that there should always be some strong color somewhere. Of course these modifications of mixed tints are, in art, almost inexhaustible, as they are in nature. Yet, in connection with this subject of the due exhibition of sculpture, they require special means and scope for their presentation. Therefore I have not attempted ocular illustration to-night.

As I observed just now, I have on this occasion only had the opportunity of considering, at all closely, the subject of color and statues in exhibitions. The same general considerations, however, hold when they are associated more intimately and substantially with architecture. Thus, I would hope that, although restricted by my limits from going into the whole subject, the portion taken to night to some degree illustrates my whole view, namely, that while the harmony of color of statues with their *entourage* is highly important, that this does not necessarily entail the desecration of the surface of the statue itself, but that, on the other hand, this is more justly to be done by so selecting and adjusting the surrounding colors that they may require the natural tint of the marble itself to complete the picture.

Arrangement together of Painting and Sculpture.

I am now nearly at an end, and have but few more words to add, which, however, will take us a little beyond the consideration of color as merely subordinate and subsidiary to sculpture. I now allude to such cases wherein color is presented by the sister art of painting when exhibited together with sculpture in one and the same gallery. First, however, we will give a preliminary thought to that mode of the presentation of painting which still may be considered subsidiary, only however, from the method and material in which it is worked—I mean tapestry. We well know that Raffaelle did not consider his master-mind and hand debased by designing for tapestry. The noble cartoons in Hampton Court are a sufficient evidence of this, having been executed by himself and his assistants expressly for this purpose. It is not, however, because the colors are produced in tapestry by the needle or loom, instead of the brush, that I speak of it as subordinate, but only in accordance with general custom. Pictures in fine needle work as hangings have usually been considered of the nature of furniture as well as art. Their textile rich surface expressly fits them for their subsidiary purposes. We may well suppose, for instance, that a beautiful classic group in Parian marble of Cupid and Psyche, would appear admirably on a pedestal of polished Sienna and other marbles standing in a room which should be surrounded with rich tapestries pourtraying their story, as told by Apuleius and other classic authors. Actually in practice, indeed, tapestry with its varied hues and texture and subjects of interest will often unite admirably with sculpture, as some of those present may have had the opportunity of observing.

We will now, however, pass on to the harmony of works of the two arts, painting and sculpture, when they meet on a level of direct equality, as in galleries for their reception. This is a point not for the sculptor alone to consider, but also for the painter; also for the general art-lover; also for the public; for opinions are various on this point. My own is that they may be made to harmonise perfectly in combined exhibitions, which thereby may be made the more attractive. Still, however, I conceive tha this would require special arrangements, so that, on the on hand, the white tint and brilliancy of the marbles may no injure the effect of the pictures by too close a juxtaposition

and on the other, that these may not injure the effect of the statues by the cross-cutting lines of the gold-frames which surround them. Therefore, as a general rule, this might point to the conclusion that in a picture gallery where sculptures are introduced, the latter should be at intervals where special arrangements should be made. In the centre of saloons also, such statues and groups as look well in a downright light might well have situations; also at the meeting of cross-ways; also busts, or even statues on each side of doorways, but in these cases it would appear that they should have suitable back-grounds afforded by draperies or other materials.

Of the direct association, however, on a dignified scale, of works of painting and sculpture of a high class but few examples exist in galleries of exhibition. Those which most readily occur are afforded by the celebrated Uffizi gallery in Florence. This was adapted by Vasari, in the early part of the 17th century, to the reception of works of art. It consists of two long corridors and about thirty rooms, in which works of painting, sculpture, and decoration are variously arranged. The Niobe room contains that well-known series of Greek statues. It also contains some historic pictures by Rubens, some portraits by Lely, and some hunting subjects by Snyders.

The most celebrated apartment, however, in the Uffizi gallery is the Tribune, which also affords the best example of the exhibition together of works of the two arts. The works therein exhibited are of the highest excellence, reputation, and value. The works of sculpture contained in this room are five in number, the celebrated Venus de Medicis, the Apollino, the Dancing Fawn, and the group of the Wrestlers, boxers, or pancratiasts, as they are variously called; also the knife-grinder or slave whetting his knife. The pictures are almost of equal celebrity, and are from forty to fifty in number. Among them is one picture by Michael Angelo, and several by Raffaelle; as the Madonna with the Goldfinch, St. John preaching in the Desert, and the portraits of Pope Julius, of the Fornarina, and of a Florentine lady. Titian also has here his celebrated Venus, also another Venus, and a portrait of an Archbishop. Paul Veronese has a Holy Family with St. John and St. Catherine. Also, there are examples within these walls of the works of other celebated painters, as Annibal Caracci, Spagnoletti, Guercino, Daniel di Volterra, Correggio, Andrea del Sarto, and Vandyke, as well as the grand Isaiah and Job, by Fra Bartolomeo, so that this room presents an associated exhibition of works in both the arts, not to be surpassed for beauty and excellence. Although I acknowledge I have met with some who have taken exception to the arrangement of this room, yet by most it is highly admired. I think it may be said generally to be by far the most interesting room of art in the world. One more often hears it spoken of, and that with high admiration, than any other room of art, and in this the works of painting and sculpture are associated.

There are some other examples, on the continent, of galleries of exhibition (for to that section I restrict myself) in which works of painting and sculpture are associated more or less happily. Occasionally, also, on a very small scale, we have seen this done in London, as at the British Institution. Also, in the International Exhibition in Paris, in 1855, this was done with good effect. In some degree, indeed, we set the example on that occasion, as mentioned at page 81 of our bound reports of that Exhibition, in which it is stated "After many applications, the Imperial commission at length assented to statues being placed down the centre of our picture gallery; when arranged, the general effect was so satisfactory that it led to a like treatment being adopted for foreign statues in the corresponding galleries of the building." This theory, however, of combination is, I conceive, capable of much more development than it has as yet attained; and that in practice, with due attention and scope, the exhibition together of the works of these two sister muses of the fine arts may be made eminently attractive and complete in effect, perhaps more so than by any other method. As such, I would submit it as a worthy subject for discussion. The time, however, warns me of my limits, and I now leave this subject in the hands of those who, I hope, will oblige the audience and the Society with their remarks and experience in elucidation of the above subjects.

DISCUSSION.

The Secretary read the following letter from Mr. John Ruskin, who says:—

I have received the proof of Mr. Bell's most interesting and valuable paper; I cannot, I regret to say, attend the meeting, having an inevitable appointment elsewhere, but if I had been able to atend, I could only have expressed—in my nearly total ignorance of the subject—my hope that Mr. Bell's evidence and arguments may be found conclusive. I have always felt colored sculpture to be a mistake, but never ventured to express my feeling—having, as I supposed, all Greek and Thirteenth Century Gothic practice against me. I am sure that whatever the Greek sculptors and painters did without compulsion, or specially religious motive, and as artists merely, was absolutely and in all points Right. But what this abstract artistical work and what the compelled or needful work severally were, I know not.

Professor Westmacott, R.A., would sincerely congratulate the Society upon the able paper which had been brought before them that evening. Having himself read a paper upon this subject before this Society some time ago, he thought the best way of opening the discussion was to admit at once that the ancients did color their sculpture. There could be no doubt about that. It had been said that he had argued that the ancient Greeks did not paint sculpture, whilst the authorities which he quoted showed that they did so; but this was entirely a mistake,—he had never made such a statement. He begged therefore to state, at the outset of his remarks, that he believed the ancients did color their statues. The subject was one, however, which ought to be considered under various aspects. There was, in the first place, the æsthetic or sentimental aspect; then there was the architectural and decorative aspect; and there was also that question which Mr. Bell had so intelligently treated—the desirableness or not of adding color to sculpture. Now, with regard to the first of these, the æsthetic or sentimental aspect, the coloring of ancient statues, such as he believed it to have been, was evidently not for the purpose of imitation. The colouring signified something special, and this was very evident from the works that had descended to us from the Assyrians and Egyptians. Certain colours were employed to express certain qualities, and therefore they found certain statues painted red, some green, others yellow, and so on, and he had not the slightest doubt in his mind that those colours were associated with certain qualities they were intended to express, as appertaining to the particular divinities or personages so that they must consider the application of color, even in the most ancient times, as purely mythical. They could not, however, associate this with their present feelings, and they must make a distinction between the practice of the ancients, of which they knew comparative little, and the practice of the present age, with which all were familiar. He did not go with Mr. Bell in believing that coloring statues was necessarily a mark of idolatry, because he believed, with him, that in the finest days of art, after Phidias, they found the coloring of statues was discontinued—but certainly idolatry was not discontinued—that was carried on as sentimentally as before; so that, though idolatry lent itself to the coloring of statues, it was not the cause of it. But the reason why the cruseo-elephantine statue of Minerva was executed in those rich materials was this—the great statue of Minerva was made out of the tenth of the spoil taken by the Athenians after their victories, and therefore the application of the richest materials was the manifestation of their gratitude for the victories they had obtained, and this was the only means they had of offering

those immense riches to the highest purposes to which they could apply them, which was in forming the statue of their divinity. But he was disposed to lay less stress than some persons did upon the ancient authorities upon these matters, and for this reason: It was a remarkable fact—and none of the gentlemen who were advocates of polychromy had a word to say against it—that they had not a single example of fine ancient sculpture, which showed traces of anything like the coloring they proposed. He had studied the subject for many years, and the nearest he had come to anything of the kind, was when the remains of two statues were recently discovered in Athens, which were brought up from a depth which could leave no doubt as to their being in their original state, except as to age and dilapidation; but there they were with coloring upon them. And how did they think it was put on? A surface of wash or plaster was put over the statue, and upon that the color was laid, and that color was a brilliant red! Could they conceive, when they examined the finest specimens of art in the British Museum, that a sculptor who had brought up these works to that high degree of perfection, would have suffered that they should be washed over with a sort of plaster in order that they might be painted? The idea was too absurd! But those examples of coloring he had seen had been prepared in that way. The advocates of polychromy were very fond of quoting Plato. It was a grand name, and it was the only hook which they could hang their speculations upon. But what did Plato say in that dialogue from which Mr. Bell had quoted. They had heard the passage read as to what Socrates said. Let them remember the particular period at which Plato lived; it was at a time just before art became perfected, and from the most remote times there was no doubt that idols had been painted. Phidias was the first who broke through the earlier character of art. His master, Milo, was himself a great man, according to the writings of the ancients, and we had a good copy of one of his works in the British Museum, in the discobolus. Living then at the period he did, Plato had all the prejudices of the old school upon him, and in the old school statues were usually painted. But after all what was reported as being said by Socrates in that dialogue, was perfectly correct. He said, *if* they did so-and-so in painting statues they would be blameable; but he did not say that every statue of that time was painted. The advocates of polychromy asserted that Nicias, the brother-in-law to Phidias, painted his statues. But there was no authority for this statement. He defied any scholar to show that there was a word to prove either that Nicias ever painted any statues, or that Phidias authorised his doing so. Praxiteles was asked which of his statues he admired and valued most, and he replied—the expression was a remarkable one, and he would put it into as close English as possible —"Those to which Nicias has lent a hand"—*imposuit manum*. That was all he said. Then Pliny, who lived 400 years after, said, "so great a value did he set upon the *circumlitio* of Nicias." Pliny wrote down everything he could catch hold of; he was constantly running about like a reporter for every scrap of information he could get, and this comment of his own was really of no value. What was the derivation of the word circumlitio? *Circum* was a round, and *litio* came from the verb *lino*, "to rub." It was a rubbing round, or giving a surface to it; and a statue was deteriorated if—to use a plain term—the "shine" was taken out of it. He had no doubt that the excellent treatment of Nicias consisted in giving a beautiful surface to the marble, literally with his hand. They knew that in the statues of Canova the surface was very beautiful, but there was no paint upon them. He would never have allowed paint to be put upon them, but the Abbate Canova, his brother, had some special mode of producing this exquisite surface, and even, perhaps, of slightly modifying the tint of the marble, but he (Mr. Westmacott) had never succeeded in ascertaining how this was done. He now came to the question of the desirableness of coloring statues. There had been great attempts made in this country, for the last eight or ten years to introduce a liking for colored sculpture. After all, it was a matter of taste, and people in that respect had a right to be pleased, but as a professor he was bound to give his reasons why he thought it was better that they should not fall into this practice. He was bound to tell them what he believed to be the principle of sculpture. Sculpture was the art of form, and painting was the art of color. Now, if a sculptor produced a statue so fine as to imitate nature, wholly without vulgarity or meanness—as they saw could be done in the works of Phidias, even to the little dragging of the skin and flesh:—if those works were to be added to by color, that refinement of execution would be lost. They, therefore, left the art of sculpture, and did they arrive at that of painting? If the sculptor himself was a first-rate painter, he might paint his statue as he pleased; but if he called in another man to turn out a relieved round picture, whose work was it then? The painter's or the sculptor's. Thus inevitable confusion would result. In the 16th century, the Spaniards devoted themselves very elaborately to the production of coloured statues. Life-statues were produced which were covered with a thin skin of canvass or cloth, and then painted, and the statues of monks and fathers of the church were so marvellously true to nature that they made one start to behold them, it was unpleasant to be in the same room with them, they were so near nature without being actually nature. They were still, however, far from nature, at the same time they were not art. They were neither one nor the other, and therefore he thought this attempt at actual imitation was a mistake. There was another reason against this practice. The painting, if done at all, should be done well, and the imitation should be as complete as possible. He did not agree with Mr. Gibson's ideas on this point, who went to the extent of saying he did not mean to make statues exactly like nature, but merely to give them a little tint. That was neither one thing nor the other, but he (Professor Westmacott) said, have one thing or the other. Allow him to fill up any gallery they pleased with statuary—the Apollo, the Hercules, the Venus, the Boxers, or other statues, and let him send to a first-rate painter and say, "I beg you to paint them—none of your tinting—but paint them like men and women," and he would then ask would they take their wives and daughters into that gallery? This was a strong reason for his advising them not to encourage the fashion of colouring statues. He (Professor Westmacott) did not hesitate to say he had not seen a single instance of it in which the effect was not painful. Some specimens were shockingly bad, but some four or five he had seen well painted, though they were disagreeable as works of art. He did not know how to look at them—whether as paintings or sculpture. There was another danger—that was, of exercising sculpture with a view to fascinate people by statues of a sensuous character. They would have artists producing a class of subjects merely as specimens of sensuous beauty, and thus one of the most pure and beautiful arts they possessed would be degraded and prostituted to the most improper objects. The only further observations he would offer upon the remaining portions of Mr. Bell's paper were as to the coloring of rooms in which sculpture was exhibited. He was very glad Mr. Bell had touched upon that subject, as one of the principal grievances he (Professor Westmacott) had felt since he left his profession was the utter want of taste that he had seen in our public buildings, and other places, in the backgrounds used for works of art. Mr. Bell had brought before them the reasons that were alleged for putting the "furnace-like" colors at the back of the statues in the British Museum. Some time ago the trustees did him the honour to consult him upon the subject, and he had long protested against the coloring used as a back-ground for the sculpture in the Royal Academy. As Mr. Bell had very properly remarked a lighter background was highly preferable. In the climate of this

country, works of art, especially statuary, had a tendency gradually to become darker in color. Every five or six years added a darker and deeper tone to a statue, and it was as much as they could do in the British Museum to keep up the statues to a good color. It was said that the sculpture must have a dark back-ground to relieve it. Upon that argument, in succeeding years the back-ground must be made very dark indeed, but what they should really do was to make the walls light. In most days of the year the upper part of the sculpture rooms was like a dark vault, and unless they had strong day-light they could not see what the color was. The very first entrance to the sculpture rooms of the British Museum had a depressing effect, which was very different from the effect produced upon entering some of the repositories of art on the continent. There they felt elated, and looked about them with pleasure, but the heavy coloured ceiling of the British Museum had a most depressing effect. He would say, in conclusion, he had listened to the paper with very great pleasure, and he was gratified to find that whilst Mr. Bell was occupied with the production of his works as a sculptor, he could afford time to vary his labours by those lighter and collateral studies, of which the present valuable paper was a result.

Mr. J. G. Crace would, at any rate, vary the monotony of being upon the same side as the gentlemen who had addressed them, although they had advanced many arguments which had taken the words of his mouth. Two years ago, it was scarcely so completely confessed that polychromy did exist amongst the ancients to the extent that was now acknowledged; and it must be recollected that those who advocated it as having existed in ancient times did so for that reason only; and from the circumstance of its having been adopted by so civilised a nation as the Greeks he thought it was worthy of some consideration at the present time. He had been highly gratified with all that had fallen from Mr. Bell, who had brought forward many arguments worthy of consideration, and which must be highly interesting to all who had heard them. But with reference to the quotation which Mr. Bell had translated as an argument against the advocates of polychromy, he thought he had made a little mistake, which a more careful consultation of his dictionary would have saved him from. Upon a reference to Ainsworth, he thought a different sense would be given to the passage, which he would now quote:—"Praxiteles, the great Athenian sculptor, when asked which of his marble works best satisfied him, replied, 'Those which Nicias has had under his hands.' 'So much,' says Pliny, 'did he prize the finishing of Nicias.'" *Tantum circumlitioni ejus tribuebat.* The word in question was *circumlitio.* As Mr. Westmacott had said, it was a compound word derived from *circum*, around, and *litio*, which was a substantive derived from the verb *lino*, to which verb Ainsworth gave this translation? "To anoint, to daub, or paint." The compound word *circumlitio* in the dictionary was translated "anointing, polishing, brushing, putting on the last hand to a picture or piece of paint." So that after all, the argument was as strong as ever in favour of polychromy. He maintained that no man could have enjoyed a reputation as a painter of statues, if he had simply rubbed them up as a mere wax polisher. The Greeks were not a nation who would have adopted as a celebrated man one who was merely a wax polisher. The Greeks were known to have employed coloring for their statues, as well as in the decorations of their architecture, and this Nicias, according to tradition, was celebrated in that art which enjoyed such high repute amongst them. He did not go so far as to say that statues were always painted, but he maintained that, in certain positions, more especially as connected with architecture, the painting of statutes was attended with high artistic results, and that statues were often placed architecturally in such a position as that their main beauties were almost destroyed, and if those beauties were properly displayed by a highly scientific painter, accustomed to that particular art, better effects would be produced. But here was the difference. Popular prejudice had been unfortunately raised by the very unartistic effect of the color on the Parthenon frieze at the Crystal Palace. It was at one time universally denied that the original work was ever colored, but now it was acknowledged to have been so; and he submitted that the artistic qualities of the work were better displayed thus than if left in the pure marble. With reference to the statues only being painted as emblems of idolatry, he did not hold with that opinion. He did not believe that practice would have been carried out against the national feeling of a people who were so keenly sensitive to all the peculiarities of art; he did not believe they would have adopted a system antagonistic to their feelings in other respects as applied to statuary art. He did not advocate it in every instance. He did not advocate it for sculpture in galleries; all he said was, he did not believe, because this had been imperfectly done hitherto, that it would not be worth doing properly. He now came to the question of color as applied to walls as the back-ground for sculpture. No doubt that would greatly depend upon the absolute condition and coloring of the statue itself. To place a statue in a very light colored room would be utterly destructive of all its beauties. The grey color mentioned by Mr. Bell would answer extremely well in the form of drapery, where the statues were modern, and arranged in a room capable of admitting a full flood of light; but if a statue was of itself low in tone it would not bear a light color as the back-ground for it. And in such case they must have resort to a deeper retiring maroon colour, which would throw the statue out by its own deep tone. He did not hold with the idea that they must not color the walls dark, because of the tendency of the statuary to become darker; the coloring of a wall did not usually last very long, and they might fairly suppose that that dark tone would not come upon the statues in our own day. But this he would say, that if the old statues alluded to in the British Museum were placed in front of a grey ground, they would look like so much dirt, and the only way in which we could properly appreciate their beauties of form was by giving them a good retiring deep-coloured back-ground. In foreign galleries, where statuary alone was placed, he had seen that plan carried out, and he might particularly mention the Glyptothek, at Munich, where the deepest colors were employed, such as deep red or green, in the form of marble. Referring to the South Kensington Museum, where Mr. Bell stated he had given his advice, he quite agreed with him. The subjects there exhibited were for the most part plaster casts painted white, and the grey color of the back-ground harmonised perfectly, but he felt bound to say that Mr. Bell's own statues, placed against the stone wall of St. Stephen's gallery in the Houses of Parliament, did not fare so well as if they had been relieved by a deeper color. Marble was one thing, and a painted plaster cast was another. There was a certain transparency in a marble statue which they could not impart to the cast, however well finished. He, therefore, thought a great improvement was made in the artistic features of the British Museum when the colored walls were introduced as they now existed. He had had nothing to do with that personally, and hardly knew the gentleman through whose advice it was done; but he considered great taste and judgment had been exercised in what had been done there, and he thought a change greatly for the better had been effected by these high ceilings being brought out with powerful colours. Upon the subject of associating statues and paintings in the same room, he would merely remark that Mr. Bell had pointed out the way in which they could be well brought together. He (Mr. Crace) thought it was most successfully accomplished in the Manchester Exhibition of Art-treasures, and afforded great relief to the picture gallery. They

were kept out of view as between the beholders and the pictures, and formed centre groups, whilst the pictures themselves, seen at a distance, formed an admirable background to the statues. This gave a high art character to the exhibition—this union of sculpture and paintings. A gallery of paintings was highly relieved by the introduction of a few pieces of sculpture—if properly placed.

Mr. R. Redgrave, R.A., had listened with pleasure to what had fallen from Mr. Bell and Prof. Westmacott, and very much agreed with what those gentlemen had said. It was, however, out of his province to say much about the coloring of statues; and he would confine the few remarks he should offer to the subject of the union of pictures and statuary. He thought such a union advantageous, but was sorry Mr. Bell had fixed upon the Uffizi gallery as an illustration of his views on this point, as he (Mr. Redgrave) thought that was the most unfortunate instance of a union between pictures and sculpture that could possibly be found. He could understand a rare collection of jewels being attractive even in a casket; but still he thought they would rather see them displayed in a tasteful manner upon a lady's person than all huddled in a heap together. In the Uffizi gallery the sculpture appeared to be in the way of the beautiful pictures. At the same time, he agreed that, at Paris, there was an admirable display of the union of pictures with statues, but there the works of art being arranged in a series of cross galleries, the statues were placed with good effect at the intersections of the galleries of paintings. There were cases, hower, in which this union of the two arts could not be so satisfactorily accomplished, as it was sometimes difficult to obtain, in the centre of a gallery, the proper light that was requisite for bringing out the beauties of a statue, and the angle of light that would suit a picture would often not do for a statue; moreover, from the drawing which Mr. Bell had made, it was shown that, in most cases, sculpture was exhibited to the best advantage in proximity to a wall or back-ground. He thought there were not many sculptors present who would allow that a statue was often equally good on all sides, and therefore he thought they should be in niches along with the pictures, or in such an intersection of galleries as had been spoken of. With regard to the color of the back-ground he agreed with Mr. Bell in thinking that a neutral light color was better than a dark one. It would soon be seen what the Royal Academy would do in this respect in their approaching exhibition. They were certainly following the example of the South Kensington Museum, and his only fear was that they would adopt too light a color. He had examined all the principal galleries of art on the Continent, and he regretted to say that he scarcely found one where the sculpture was, according to his views, properly displayed. The large proportion of statuary was lost or buried, so as to attract but little attention. This was especially the case in the Uffizi gallery; but that was not so much to be wondered at, when it was considered that it was not specially constructed as a gallery for exhibition, but consisted of the offices of the Republic turned into a depository for works of art. Mr. Bell had very properly brought forward the question of the lighting of rooms in which sculpture was exhibited. In the new gallery of the Vatican, where there was sculpture only, the lighting was admirably adapted, as he conceived, both for sculpture and paintings. Each statue was placed within a niche, with busts alternately arranged. The light was well managed, at an angle of about 45 degrees, and the walls forming the back-ground were well adapted for the due display of the various works of art. With regard to the coloring of statues, although he was no advocate of that system, he would say he thought Professor Westmacott had carried the point a little too far. Whilst he was in Rome, he saw Gibson employed upon a colored statue, and he confessed it shook his faith a little in the strong objection he had entertained against that system. The great objection on the part of Mr. Bell, on the ground that the surface of marble could not always take a uniform delicate tint, and that the "goose flesh" appearance destroyed the effect was, no doubt, a valid one.

Mr. Milnes said two years ago he had an opportunity of seeing Mr. Gibson's performances upon coloring statues. He had three finished statues from the same model of Venus, and when he saw them he unhesitatingly gave his preference to the pure marble. He had visited about 200 studios, and wherever he could obtain an expression of the opinion of the artists, it was in favour of the pure marble.

Mr. Bailey congratulated Mr. Bell upon the able manner in which he had treated this subject, but there was one little matter which he had not touched upon. It was this, that if coloring of statues were to be adopted, the merest novice in statuary art might, by the help of the painter, become a first-rate artist. He could not help conceiving, although it might be considered unbecoming in so young a sculptor to hazard such an opinion, that the simple act of modelling a statue and executing it in marble did not constitute a man an artist, for those were operations purely mechanical. A man who had no art in his soul could become acquainted with the due proportions of the figure, and could tell how each bone and muscle should be developed, but that man was not of necessity an artist; but if such a man produced a statue, however rude, it might become, under the hands of a skilful painter, a most exquisite work of art. He thought art consisted in putting vitality into the sculpture—that which sculptors called feeling. Some of the finest carvers had found their work merely stone, after all their labour upon it; but after a skilful sculptor had worked upon it for four or five hours the effect was astonishing, simply because he had put vitality where there was before merely stone. If the public gave an opinion in favour of coloring statues, he would ask whether the chances were not that they would be no better than those rude imitations of nature which Mr. Bell had alluded to, and which could only be identified by the color put upon them.

The Chairman would now rise to ask the meeting to give its best thanks to Mr. Bell for the very interesting paper he had read, which displayed so abundant a knowledge of the subject, and which had called forth so interesting and valuable a discussion. It was matter of congratulation to them that so large a number of persons should have shown themselves sufficiently interested to attend at a meeting for the discussion — not of the execution of any particular work of art—but of the principles on which works of art should be executed. It was pleasant to think that that which was calculated to elevate and instruct the mind, was, at the same time, interesting to the public at large, and that art and the practice of art should occupy the attention of so large an assembly. He felt himself quite incompetent to take any prominent part in a discussion of this kind, but they had heard the views of eminent men who had devoted their life to art, and who had offered many arguments on both sides on a question of considerable interest—probably of more interest than utility—because he thought most of them would agree with Mr. Westmacott that the question was not so much what the Greeks did many centuries ago, as what they themselves ought to do. No doubt they should pay great respect to the tastes of a people like the Greeks; but at the same time they could not conceal the fact that they might have been influenced by precedents that came down to them from other times, influenced also by circumstances of climate and other matters; and what might have been a high order of art for the Greeks might not be the proper principle on which to proceed in the present day. Mr. Bell had divided his subject into three parts—the painting of statues, the use of color around statues, and the combination of pictures with statues. The two latter subjects were of special interest in connection with the forthcoming Exhibition of 1862, thus making their discuscussion peculiarly opportune. Numerous and various

works of art would be exhibited on that occasion, and, it was to be hoped, in the most advantageous manner. Any points, therefore, involving questions of arrangement, were particularly worthy of attention at the present moment, and of discussion by those most competent to treat them. As far as the first section of the subject was concerned, that of color on statues, he was glad to be able to say that an opportunity would probably be offered them, in that Exhibition, of judging to some extent of the effect thus produced, inasmuch as Mr. Gibson's celebrated colored Venus would, he believed, be exhibited on that occasion.

The vote of thanks having been passed,

Mr. Bell expressed his gratitude for the kind manner in which his paper had been listened to, and especially to those gentlemen who had taken part in the discussion, for the more valuable information they had communicated. At that late hour he would not attempt to reply on any of the points that had been raised by this discussion, but, as far as the coloring of statues was concerned, he would venture to say a word, as it appeared the question was rather a vital one at the present time, and one in which, as Englishmen, they were particularly interested. This was especially the case with regard to the bust of Shakspere at Stratford-upon-Avon. He saw, by the public papers, that that bust had been lately painted in imitation of nature. When he was in that locality about fifteen years ago he made a close inspection of that bust, and he felt quite assured of its authenticity—he meant that it was carved from a cast of the face after death. If anybody having a plaster cast of that bust would lay it on its back, he would see that it presented the exact appearance of a person lying supine in bed, as regarded the position of the head, and the drooping of the flesh and muscles. In a cast taken after death from nature, the mouth and eyes would be closed, and those were the only parts of the features which would have to be altered in carving the bust from the plaster cast, and it was remarkable that these were the only parts in that bust which were not good. In every other respect it was a noble head. This was easily accounted for when one considered what was evident from the general execution, that it was the work of an inferior artist. He could copy perfectly well when he might copy exactly, but when he had to modify, he was at fault. He (Mr. Bell) had paid considerable attention to this bust, and had got up close to it in the church. It was commonly supposed that the forehead of Shakspere had no lines across it, but close examination of this bust showed the contrary. He apologised for alluding to this subject, but he only did so to remark that, if the taste for coloring statues had come to such a point that they tampered with such a valuable relic as the bust of Shakspere, it was time that public attention was called to the subject.

The Secretary announced that on Wednesday evening next, the 1st May, a Paper by Mr. Julius J. Dahlke, "On Filtration and Filtering Media," would be read.

ANNUAL EXHIBITION OF THE PAINTERS' COMPANY.

The Trade Committee of this Company have made a Report to the Court of Assistants, which, in addition to reciting the measures that have been taken towards the coming Exhibition of the present year, gives the following detail of an arrangement with the Society of Arts.

The Society of Arts invited a Deputation of the Painters' Company to meet a committee, appointed by the Council, to confer on the matter on Monday, the 18th of March. In consequence, a deputation, consisting of Messrs. Obbard, Sewell, Buzzard, Laing, and the two Clerks, attended.

Mr. Sewell opened the proceedings with a brief account of the objects the Company had in view; and the mode in which it appeared that the Society of Arts could aid it. After a full inquiry and discussion, principally carried on by Mr. Harry Chester, the Chairman of the Committee, Mr. S. Redgrave, Mr. Bell, Mr. Crace, and Mr. Graham, on the part of the Society, the Committee declared they were prepared to recommend that aid should be given to the Company, and the following letter, addressed to the Company by the Secretary, shows the result:—

"Society of Arts, Manufactures, and Commerce,
"Adelphi, London, W.C.,
"30th March, 1861.

"Gentlemen,—The Council of the Society of Arts, Manufactures, and Commerce, having considered the statements made, and the wishes expressed to them by the Worshipful Company of Painters, otherwise Painters' Stainers, appreciate highly the public spirit and intelligence which have led the Company to endeavour, by well-timed measures of practical utility, to renew its traditional character, as a Corporation having authority in respect of the Decorative Art.

"The Council understand that the Company's Second Annual Exhibition of Specimens of Marbling, Graining, Arabesque, Glass-work, and Mediæval and Ecclesiastical Ornament, will be opened at Painters' Hall on the 1st of June; that foreign and native operatives may send in specimens of their work on the same terms; that the Exhibition will be free both to the competitors and the public; that the Company and the Exhibitors will name three, and two of the judges respectively; and that to each of the successful competitors in marbling, in graining, in writing, and in decoration in oil or distemper, the Company will award not only a certificate and a prize, but also a gift of its freedom.

"It appears, also, that the Company desires to establish a school, with lectures and classes, where operatives may receive instruction in the various arts of decoration.

"The importance of industrial instruction in a great commercial and manufacturing community can scarcely be estimated too highly. To do justice to the industry, perseverance, intelligence, and manly spirit of the artizans and mechanics of the United Kingdom, an education, not of the head alone, but of the head, hand, eye, and taste, is obviously needful. The Society of Arts, by its systems of examinations, certificates, and prizes, has done something to stimulate the industrial classes to strive after that education of the head which they greatly need; but though nearly one hundred local boards of examination have sprung into existence to co-operate with the Society in the prosecution of that object, the Society has not as yet seen its way to the creation of any satisfactory machinery for stimulating and testing, by competitive exhibitions or otherwise, that education of the hand, eye, and taste, that practical skill, dexterity and refinement, which, no less than knowledge, are necessary to the success of the artizan and mechanic in their various arts and handicrafts.

"The Council then cordially welcome the Painters' Stainers as coadjutors. Their project is capable of valuable extensions, and may serve to indicate to other ancient corporations and independent public bodies, an opening whereby, through similar or analogous means, they may renew that usefulness which time, in some measure, and in some particulars, may have somewhat impaired.

"In compliance with the Company's request, the Council of the Society of Arts have nominated three gentlemen, viz., Mr. William Dyce, R.A., Mr. J. Gregory Crace, and Mr. Peter Graham, and they have obligingly consented to be associated with the five judges, above referred to, at the forthcoming Exhibition. The decisions (of the eight) will be given of course in the name of the Painters' Stainers Company, not in the name of the Society of Arts. If, however, the three gentlemen nominated by the Council shall find among the specimens two or three which shall appear to them to possess peculiar merit, they are authorised to recommend them for some special recognition by the Society of Arts.

"The Council has pleasure in assenting also to the pro-

posal that when the Exhibition is closed at Painters' Hall, the Company shall send to the Society's House for further exhibition here, a selection of the most meritorious and interesting works.

"The Council have voted Ten Guineas, which is offered by them as a contribution to the Company's Prize Fund.

"I have the honour to be, gentlemen,

"Your obedient servant,

"P. LE NEVE FOSTER,

"Secretary.

"To the Court of Assistants of the Painters' Company."

At the Quarterly Court of Assistants, the foregoing letter was duly acknowledged, and the following resolution unanimously passed:—"That in consequence of the very handsome letter received from the Society of Arts, the Court of Assistants, in the name of the Painters' Company, desire to convey to the Society of Arts, Manufactures, and Commerce the high sense they have of the courtesy with which the application of the Company was met by the Committee appointed by the Council of the Society; and also to express their cordial thanks for the valuable assistance offered in the letter of the Council of the 30th ultimo; the terms of which they hereby accept as highly honourable and valuable to the effort now making by this Company; Also, that the provisions proposed in the said letter be carefully acted upon and be rigidly complied with, and that the handsome donation of Ten Guineas, made by the Society of Arts, be applied towards the production of the medals to be awarded by the Company under the judgment of three members of the Company, two of the trade not being members thereof, and the Three Members appointed by the Society of Arts."

It was also resolved that the following Prizes be awarded to the successful competitors at the ensuing Exhibition:—

First Class.—Silver Medal and the Freedom of the Company, to four competitors.

Second Class.—Bronze Medal, to four competitors.

Third Class.—Certificate of Merit to four competitors.

NATIONAL EXHIBITION AT NANTES.

The *Daily News* says that the city of Nantes is now engaged in preparing a National Exhibition, which will open on the 1st July next. Industrial productions of all kinds, works of art, and the agricultural and horticultural produce of the whole of France and the colonies will be admitted. The city of Nantes will pay the expense of the carriage of all articles intended for the Exhibition, and also for the return charges for such as may not be sold and which shall have obtained a medal.

Home Correspondence.

ARRANGEMENT IN THE EXHIBITION OF 1862.

Sir,—It is rather remarkable that my letter to you of the 9th inst., suggesting the propriety of the articles sent for competition in the international Exhibition of 1862, being arranged according to classes, instead of countries, should have appeared in the same number of our journal as that of M. Steinbeis, who would seem to have discussed the question as it were by anticipation, and to have arrived at an opposite conclusion. After a careful perusal of his communication, I fear I must in all candour admit that the arguments derived from his experience as a Royal Commissioner for Wirtemburg at the Exhibitions of London, Paris, and Munich, go far to shake my confidence in the expediency of a strictly classified arrangement. Nor indeed, if it were otherwise, is it necessary to discuss the question further, as I have reason to know that the Royal Commission has decided that, as before, each country shall have an assignment of space according to its requirements as made by authorised commissioners. It may, however, be practicable so to modify this cardinal principle, as in the case, for instance, of minerals and mineral manufactures, to permit (as suggested by Professor Ansted, and urged in the memorial to the Commission, signed by some of the most eminent owners of mineral property in this country, printed in our journal of April 19,) a scientific arrangement of the whole collection in one locality. This will not involve, as has been erroneously supposed, by a misapprehension of a paragraph in the Professor's paper on the subject, "a most unpopular scientific arrangement," nor an entire merging of the contributions of different countries into one common heterogeneous mass, but the adoption of such a well-digested plan as will afford the greatest facilities for study and comparison to the student, professor, manufacturer, and purchaser. If this would hold good of the products of the mineral kingdom, it would not be difficult to show, if necessary, that there are other classes of articles equally susceptible of a scientific arrangement (that of silk for example, with which I am most familiar), without wounding the *amour-propre* of competing interests.

Something of the kind was attempted in 1851, but, as we all know, with very imperfect success, from the absence of that experience which has since been so abundantly supplied. By reference to the space occupied by foreign exhibitors in 1851 and 1855, in each class, an approximate estimate may now be formed of what they will relatively require in 1862, so that by strictly exacting, in the space appropriated to the different countries in the entire breadth of the building, an arrangement according to an authorised formula, the articles exhibited will be sufficiently near together to afford the necessary facilities for examination.

In conclusion, I am sure I may say, without hesitation, that the Royal Commissioners will at all times be ready to receive, and if practicable to adopt, any suggestions which may best promote the interests of arts, manufactures, and commerce, provided they are not made too late, and are essentially in harmony with the theory of arrangement by countries which they have prescribed.

I am, &c.,

THOMAS WINKWORTH.

Gresham Club, April 21st, 1861.

THE COTTON SUPPLY.

Sir,—I am sorry that I am unavoidably prevented from attending the meeting this evening, and this my regret is the greater, inasmuch as the subject of the intended lecture is one in which the commercial and financial interests of this great country are so deeply concerned—the Cotton supply.

If, as I am informed, it will be the endeavour of the lecturer to show that India is utterly unable to produce cotton in sufficient quantity to supply the demands of this country, it is indispensable that, in order to command the attention and justify the confidence of his auditory, he should possess no inconsiderable degree of local knowledge and practical experience, without which his lecture, however ingenious and eloquent, will be mere *vox et prœterea nihil.*

Having myself some little knowledge of the growth of cotton, I have no hesitation in saying that India, favoured as she is with every diversity of climate, is peculiarly adapted for the growth of cotton, which article it would be capable of producing in the shortest possible time, in such quantities as would suffice to supply the wants not of this country only or of Europe, but even of the whole world itself, and this merely by doubling her present growth of that commodity. Now, to prove that in making so bold a statement I am dealing neither in vague assertions, or Utopian reveries, I beg to put you in possession of the following well established and generally known facts.

The population of India amounts to, at the least, 200,000,000; the chief staple of their food being rice, and that of their clothing, for the most part, cotton, of which latter commodity 10 lbs. yearly per head will be by no

means an extravagant calculation. This would give us at once 2,000 millions of lbs., which, although an enormous figure, is a very moderate one, when it is considered that the use of cotton is extended not only to articles of clothing, but also to beds, mattrasses, bed-sackings, carpets, bags, &c. Now, let me ask, does this country, or even the whole of Europe put together, supply such articles to India, or is she indebted to America for her raw material? If neither, whence does she procure the staple for supplying the wants of her vast population? The answer is to be found in the fact that cotton grows, more or less, in all parts of the country, and is consumed by the nearest adjoining manufacturing towns and villages; as a proof of which, you will not find in India a village, however small it may be, which has not a few cotton trees at least, for the purpose of furnishing the material for manufacturing sewing cotton, or making the Janeso or Bhraminical cord.

As to the Indian cotton which finds its way into the markets of foreign countries, it must be considered either as a surplus quantity, or as the result of the endeavours of the cotton merchants who succeed in obtaining it by holding out superior inducements to the growers in those districts which, being nearer to the sea coast, are those wherein cotton has been grown to its greatest extent. The deduction from all which is—invest your capital in Indian produce (cotton) instead of in American, and you will infallibly obtain an abundant and inexhaustible supply.

I am, &c.,
HYDUR JUNG.

10, Westbourne-park-crescent, Harrow-road, April 17.

CLASS INSTRUCTION IN SCIENCE.

SIR,—It is now nearly two years since the Committee of Council on Education passed a minute by which aid is given to teachers of certain branches of elementary science, to be tested by the results of their teaching pupils in classes, and rewards are also given to the pupils for proficiency. But, notwithstanding the time which has elapsed since the publication of the minute, the valuable aid which is given, and the importance to Mechanics' Institutions of having competent scientific instructors for their younger members, very little advantage appears to have hitherto been taken of it. This has, no doubt, arisen from the difficulty of disseminating correct information by printed circulars as compared with oral communication. To obviate this difficulty, the Committee of the Yorkshire Union of Mechanics' Institutes applied to the Department of Science and Art at South Kensington for the services of a gentleman connected with the Department, who should visit a few of the principal Institutions in the Union, and give a full explanation of the mode in which aid is given to education in science by means of the grants and allowances to certificated teachers. The Department readily responded to the request, and arrangements having been previously made by summoning not only the officers, teachers, and friends of the Institutes selected, but representatives from those in each locality, Mr. J. C. Buckmaster has during the last two or three weeks been employed in this interesting and important duty. Meetings have been held at Leeds, Halifax, Bradford, Huddersfield, Dewsbury, York, Hull, Middlesborough, Wakefield, Sheffield, Batley, Keighley, &c. At each place he explained fully the mode in which aid was granted by the Department to teachers who proved the value of their services by the pupils who passed a satisfactory examination; and the great interest taken in the subject was shown in the animated discussion which followed each address. The opinion was almost universally expressed, that not only was the measure one which promised most valuable assistance in the promotion of the legitimate object for which Mechanics' Institutions were established, but that the several conditions had been most judiciously arranged for the accomplishment of the end in view. At almost every place visited it was resolved to select teachers to be examined for certificates, and to establish classes in such departments of science included in the minute as would be most in accordance with the wants or feelings of each locality.

My object in directing attention to the subject through the *Journal of the Society of Arts*, is to suggest to other Educational Unions to pursue a similar course, and, by application to the Science and Art Department for a personal visit to their principal Institutes, to bring the subject more effectually before the attention of those who are directly interested in deriving benefit from certificated teachers of Elementary Science, whether as applied to manufacturing industry or for mental cultivation.

I am, &c., BARNETT BLAKE.

Leeds, April 1861.

THE SHIPWRECK KITE.

SIR,—In the 41st volume of the Transactions of the Society of Arts, page 182, will be found a full description of Captain C. C. Dansey's, R.A., kite, as adapted to the saving of lives of shipwrecked mariners. The invention was fully carried out, and a large-sized kite was deposited in the Society's rooms, and was tried by myself and others in Hyde-park, in 1824. The kite was eighteen feet high, and formed of such materials as are always found in abundance in every ship, that is, boat sails, spars, and cordage. The kite line was held fast to the belly-band by means of a toggle, which, when struck out by a messenger sent up the main line, discharged the belly band and caused the kite to fall flat on the land or cliff, still held fast by the main line. The upright spar, or backbone carried on its head four small anchor flukes reversed, by means of which, if there were no persons on shore, a hardy seaman might haul himself to land through the breakers.

The eighteen-feet kite, presented to the Society by Captain C. C. Dansey, would require about eighteen men to hold it in a strong gale, and is therefore fully capable of towing on shore any sized empty cask, carrying a small hawser attached, so as to secure communication from the wreck to the shore, even in the case of there being no landsmen to assist, a situation almost impossible on the British coast.

Not long after the publication and public exhibition of Captain C. C. Dansey's Shipwreck Kite, the same invention was applied to the purpose of drawing carriages on the common roads, which often performed at the rate of twenty miles an hour, with two riders. In this case, in order to obviate as much as possible the difficulty of adverse winds, Mr. Purkis added two guy lines, made fast to each wing of the kite respectively, and conducted by fair leaders along the main line. By tightening either guy, the kite could be close hauled upon a wind, and, with the assistance of the steering wheels, the carriage was drawn in any direction, provided the wind was not before the beam.

The application was, of course, merely an amusing development of a boy's common kite, and could not be brought into general use, on account of the unsteady and variable nature of the moving power, as well as on account of the terror excited among the horses on the roads. Railways were then unknown.

But this power may be applied with great advantage in boat-sailing, as a kite exerts much more power than an equal spread of canvas as a sail. This mode of traction may, however, be applied in two cases of land locomotion —on the ice and hard snow in the northern parts of Europe and America, as well as furnishing the means of travelling over the sandy deserts of Africa, which cannot be crossed by caravans, in the main directions, on account of the number of days they would be without water. The carriages should, of course, be of light construction, and provided with drum wheels to prevent sinking in the sand, in which the upward tendency of draft would assist.

It will be seen that in the case of shipwrecks, which always take place on a lee shore, Dansey's kite, as improved with Purkis's guy lines, has this great advantage—

that it may be directed from the ship to fall on that part of the coast most favourable for a safe landing, and that such a kite, with its three lines, is as perfectly under control as a pair of well-trained horses.

I have been impelled to make this communication through having seen a report of the reward of fifty guineas being given to Lieutenant G. S. Nares for his invention of a kite intended for the use of shipwrecked mariners, not, however, with the slightest intention of depreciating that gentleman's inventive powers, or his humane endeavours to mitigate the dangers to which all seafaring persons are continually exposed, as I am quite sure he must have been perfectly ignorant of Capt. Dansey's previous application of the boy's kite to the same purpose. But I do not think it right that Capt. Dansey's claims for the same invention, published so many years ago in the Society's Transactions, should be wholly lost sight of by the Shipwrecked Fishermen's Society, upon whom Lieutenant Nares has so nobly bestowed the reward conferred upon him for his invention.

A detailed report of Lieut. Nares's experiments may be seen in *The Practical Mechanics' Journal* for March 1861, page 327. I am, &c.,

HENRY W. REVELEY.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Zoological, 1. Anniversary.
Philosophical Club, 6. Anniversary.
Medical, 8½. Clinical Discussion.
United Service Inst., 8½. Mr. Julius Jeffries, "On Barracks and Tents for European Soldiers in India."

Tues. ...Royal Inst., 3. Mr. John Hullah, "On the History of Modern Music."
Civil Engineers, 8. Continued discussion on "The National Defences."

Wed. ...Royal Inst., 2. Anniversary.
Society of Arts, 9. Mr. Julius J. Dahlke, "On Filtration and Filtering Media."
Ethnological, 8½. Mr. W. E. Stanbridge, "Some particulars of the General Characteristics, Astronomy, and Mythology of the Tribes in the Central part of Victoria, Southern Australia, from observations made during a residence of eighteen years."

Thurs...Royal Inst., 3. Mr. Pengelly, "On the Devonian Age of the World."
Roy. Soc. Club, 6.
Linnæan, 8.
Chemical, 8. 1. Dr. Daubeny, "On the absorption of poisons by plants." 2. Prof. Bloxam, "On the amount of water displaced from the hydrates of potash, soda, and baryta, by boracic and silicic acids." 3. Mr. Crace Calvert, "On the Graphite of cast iron." 4. "Mr. J. Davidson, "On the action of dibromide of ethylene on pyridine." 5. "Mr. A. W. Lennox, "On bromide of carbon."
Royal, 8½.
Antiquaries, 8½.

Fri. ......United Service Inst., 3. Colonel Shafto Adair, "England, her Wars and Expeditions since 1815."
Archæological Inst., 4.
Royal Inst., 8. Prof. Faraday, "On De la Rue's Eclipse Results."

Sat. .....Royal Inst., 3. Prof. Max Muller, "On the Science of Language."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Num.

Delivered on 19th March, 1861.

40. Bankruptcy—Returns.
55. Bastardy—Return.
64. Crookhaven Lighthouse, &c.—Return.
108. Army Estimates (Miscellaneous Stores)—Detailed Account.
60. Local Acts. 40. London and North Western Railway (Lines near Liverpool); 41. Dartmouth and Torbay Railway; 42. Wivenhoe and Brightlingsea Railway; 43. North Eastern Railway (Grosmont and Whitby Branches); 44. Peterfield Railway (Extension to Southampton); 45. Dublin Corporation Water)—Admiralty Reports.
69. Bill—Industrial Schools.

Delivered on 20th March, 1861.

53. Works and Public Buildings—Abstract Accounts.
29. Railway and Canal Bills (143. Alton, Alresford, and Winchester; 144. Cork and Macroom Direct; Cork and Youghal; Cork, Blarney and Macroom; 145. Devon Central; 146. Downpatrick and Newry Junction; 147. Dublin and Antrim Junction; Dublin and Meath; 148. Dumferline and Queensferry; 149. Edinburgh and Dumferline; 150. Edinburgh and Glasgow)—Board of Trade Reports.
60. Local Acts. 42. Wivenhoe and Brightlingsea Railway (a corrected copy)—Admiralty Report.
68. Bills—London Coal and Wine Dues Continuance.
78. „ Harbours.
79. „ Trade Marks
80. „ Admiralty Court Jurisdiction.
81. „ Meeting (Clauses 30, 31, 37, 47, and 53).
82. „ Marine Mutiny (Clauses 43 and 65).
Light, Buoys, and Beacons—Report of Commissioners, &c.

Delivered on 21st March, 1861.

95. Customs, &c.—Return.
106. Bankruptcy—Returns.
109. Sardinian Loan—Account.
110. Greek Loan—Account.
111. Russian Dutch Loan—Account.
29. Railway and Canal Bills (151. Edinburgh, Perth, and Dundee; 152. Edinburgh, Perth, and Dundee (Queensferry Branches); 153. Enniskillen, and Bundoran; 154. Esk Valley; 155. Fife and Kinross; 156. Frosterly and Stanhope; 157. Glasgow and Milngaire; 158. Manchester and Milford (Aberystwith Branch); 159. Midland Counties and Shannon Junction; 160. Mid Wales; 161. Parsonstown and Portrunna Bridge Railway; 162. Rumney; 163. Salisbury, Poole, and Dorset Junction; 164. West Midland and Severn Valley; 165. Wivenhoe and Brightlingsea)—Board of Trade Reports.
60. Local Acts. 46. Devon Central Railway; 47. Shadwell Ferry; 48. Margate Railway (Ramsgate Extension, &c.); 49. Cork and Youghal Railway)—Admiralty Reports.
70. Harbour, &c., Bills (5. Tyne Improvement)—Board of Trade Report.

Delivered on 22nd March, 1861.

112. Essex Turnpike Roads—Return.
116. Navy (Wooden Ships)—Return.
117. German Legion—Return.
118. Railway and Canal Bills—Third Report from General Committee.
70. Bills—Election Law Amendment.
72. „ Voters (Ireland).
73. „ Sheriff Courts (Scotland).
74. „ Cork Infirmary.
Dockyards—Report of the Commissioners.

Delivered on 23rd, 25th, 26th, 27th, 28th, and 30th March, and 4th, 6th, and 8th April, 1861.

114. East India (Government Loans)—Return.
113. Immigrants and Liberated Africans—Return.
67. Police (Counties and Boroughs)—Reports of the Inspectors.
60. Local Acts (50. Salisbury, Poole, and Dorset Railway; 51. Isle of Wight Waterworks; 52. Parsonstown and Portumna Bridge Railway; 53. Conway and Llanrwst Railway; 54. Enniskillen and Bundoran Railway; 55. Lambeth Bridge)—Admiralty Reports.
70. Harbour, &c. Bills (Wexford Harbour Commissioners)—Board of Trade Reports.
88. Metropolitan Police—Accounts.
115. East India (Railway Companies, &c.)—Return.
122. Highland Roads and Bridges—47th Report of Commissioners.
105. National Education (Ireland)—Return.
78. Bankruptcy—Returns.
38 (2). Trade and Navigation—Accounts (28th February, 1861).
128. Ship "Industry"—Return.
58. East India (Native Cavalry)—Papers.
119. Scottish Universities—Copies of Ordinances.
125. Convict Disturbances (Chatham)—Returns.
129. Kertch and Yene Kale—Return,
72. East India (Indigo Commission)—Papers.
75. Bills—Salmon Fisheries (Scotland, &c)
88. „ Royal Marine Barracks (East Stonehouse, Devon) (amended by Select Committee).
83. „ Annoyance Jurors (Westminster).
76. „ County Voters (Scotland).
77. „ Grand Juries, &c. (Ireland).
87. „ County Surveyors, &c. (Ireland).
89. „ Dean Forest and Hundred of St. Briavels.
90. „ New Forest (Regulation of the Exercise of Common and other Rights).
91. „ Bankruptcy and Insolvency (amended in Committee, on Re-commitment, and on Consideration of Bill, as amended).
84. „ Presentment Sessions (Ireland).
66. „ Disgavelling of Lands.
New Zealand (Recent Disturbances)—Papers.
Education in England—Report of Commissioners.
Local Government Act, 1858—Second Annual Report.
Public General Acts—Cap. 1, 2, 3, and 4.

Session 1860.

617. Jamaica (Newspaper Correspondence)—Return.
383 (A 10)—Poor Rates and Pauperism—Return (A).

Delivered on 9th April, 1861.

124. Bankruptcy and Insolvency Courts—Return.
126. National Debt—Account.
29. Railway and Canal Bills (166. Aberystwith and Welsh Coast; 167. Caledonian, Edinburgh, and Glasgow, and Scottish Central; 168. Colne Valley and Halstead; 169. Eastern Counties; 170. Galashiels and Peebles; 171. London and North Western, Great Northern, and Manchester, Sheffield, and Lancashire—Board of Trade Reports.

Delivered on 10th April, 1861.

134. Army, &c. (Clothing)—Returns.
123. Foreign Shipping—Returns.
29. Railway and Canal Bills (172. London and North Western (Additional Powers), Chester and Holyhead); 173. London, Chatham, and Dover (Deviations, &c.), (Lease of Margate Railway, &c.); 174. Mid-Eastern and Great Northern Junction; 175. Rhyl Harbour, Bridge, and Railway—Board of Trade Reports.
85. Bills—Stipendiary Magistrates.
86. „ Mines Trespasses Prevention.
92. „ Queen's Prison, &c.

Delivered on 11th April, 1861.

57. East India (Persian Expedition, &c.)—Return.
148. Post-office (Money Order Offices)—Return.
98. Bill—Charitable Uses.
Italy—Correspondence Respecting the Assumption by King Victor Emmanuel of the Title of "King of Italy."

Delivered on 12th April, 1861.

131 (6). Civil Service Estimates—Class 6.
131 (7). Civil Service Estimates—Class 7.
137. Army—Return.
146. Hop Duty—Returns.
142. South Kensington Museum—Returns.
60. Local Acts (56. Dunfermline and Queensferry Railway; 57. Edinburgh and Glasgow Railway; 58. Edinburgh, Perth, and Dundee Railway; 59. Edinburgh, Perth, and Dundee Railway (Queensferry Branches); 60. Edinburgh and Dunfermline Railway—Admiralty Reports.
93. Bill—London Coal and Wine Dues Continuance (amended).

Delivered on 13th and 15th April, 1861.

136. War-office (Temporary Clerks)—Return.
140. Metropolitan Drainage, &c.—Returns.
144. Spirits—Returns.
145. Spirits (Ireland)—Return.
131 (2). Civil Service Estimates—Class 2.
131 (4). Civil Service Estimates—Class 4.
131 (5). Civil Service Estimates—Class 5.
156. Committee of Selection—5th Report.
94. Bills—Burford Charities.
95. „ Guildford Hospital.
96. „ Reading Charities.
97. „ Temple Balsall Hospital.
100. „ Common Law Procedure Act (1854)—Extension.
101. „ Poor Assessments (Scotland).
Affairs of Syria—Correspondence.

Delivered on 16th April, 1861.

131 (3). Civil Service Estimates—Class 3.
150. Navy (Steam Ships, &c.)—Returns.
165. House and Income Tax (Chelsea, &c., and Scotland)—Return.
160. East India (Cultivation of Indigo)—Return.
Church Estates Commissioners—Tenth General Report.
Ecclesiastical Commissioners for England—Thirteenth General Report.
Captain Macdonald's Arrest and Imprisonment at Bonn—Correspondence.

Delivered on 18th April, 1861.

127. Criminal Offenders (Scotland)—Abstract of Tables.
135. Forage, &c.—Return.
157. Public Income and Expenditure—Account.
159. East India (Army)—Returns.
166. Army and Militia—Returns.
168. Army (Barrack and Hospital Furniture)—Return.
103. Bill—Religious Worship.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, April 19th,* 1861.]

Dated 18th March, 1861.

677. C. Isles, Birmingham—Imp. in securing or fastening envelopes, letters, or other sealed packets, and in applying ornaments to the same.

Dated 20th March, 1861.

696. J. Ridley, Stagshaw, Northumberlandshire—An imp. in reaping machines.

Dated 22nd March, 1861.

718. T. S. Truss, 53, Gracechurch-street—Imp. in apparatus for propelling ships and other vessels.

Dated 23rd March, 1861.

733. G. J. B. Loyer, 2, Brunswick-place, Brixton-hill, Surrey—Irrigating or self-supplying water brushes, brooms, and sponges. (A com.)
736. J. Billing, 12, Abingdon-street, Westminster—An improved chimney head.

Dated 25th March, 1861.

750. F. Versmann, Bury-court, St. Mary Axe—Imp. in the manufacture of colour, adapted for dyeing, painting, and other uses.

Dated 28th March, 1861.

770. F. Chevillard, Horts, France—Imp. in machines worked by concentrated power.

Dated 1st April, 1861.

808. J. Greenwood, Rawden, near Leeds—Imp. in machinery or apparatus for combing wool and other fibres.

Dated 2nd April, 1861.

812. W. A. Lyttle, 10, Arundel-street, Strand—Imp. in and connected with the collars and wristbands of shirts.
814. C. S. Senton, Park-road, Clapham, G. Hawkins, Port-street, Bermondsey, and E. Stansfield, Commercial-road, Peckham—An improved trap or flap for covering the entrances of cellars and other places.

Dated 3rd April, 1861.

819. W. Crighton and F. W. Crighton, Manchester—Imp. in machinery or apparatus for preparing cotton and other fibrous materials to be spun.
821. T. Wright and H. Wright, Dudley, Worcestershire—A new or improved steam brake.
823. J. Seville, Oldham, and W. Lawton, Hollingwood, Lancashire—Certain imp. in starting and retarding or stopping railway trains.

Dated 4th April, 1861.

825. J. G. N. Alleyne, Alpeton, Derbyshire—Imp. in machinery employed in the manufacture of iron.
826. J. T. Grice, Birmingham—An imp. or imps. in ornamenting metallic tubes.
827. R. Woodruff and C. Milnes, Red Lion-square, Nottingham—A new or improved construction of carriages for children, commonly called perambulators, to be called "The Nottingham Double Perambulators."
829. R. A. Brooman, 166, Fleet-street—An improved method of doubling silk threads together, with machinery for effecting the same.
830. W. A. Shepard, Pall-mall—Imp. in street railways, and wheels, and apparatus to be used therewith.
831. W. H. McNary, Manchester—Imp. in the mode of, and apparatus for, knitting.
832. A. V. Newton, 66, Chancery-lane—An improved construction of bran duster. (A com.)
834. M. Benson, 2, Royal Exchange-buildings—Imp. in generating steam, and in the apparatus employed therein.
835. J. S. Miller and T. P. Miller, Springfield Works, Dalmarnock, N.B.—Imp. in fixing coloring matters on textile fabrics and fibrous materials.

Dated 5th April, 1861.

836. D. Stone, Manchester, and C. Comer, jun., Salford—Imp. in combining metals and alloys of metals for the manufacture of coins, checks, vouchers, trade marks, and other useful articles, and for ornamental purposes.
837. C. Burn, Delahay-street, Westminster—Imp. in ports and apparatus for opening and closing the port-holes of ships of war, which are also applicable to embrasures of fortifications.
839. D. Brown, Smethwick, Staffordshire, N. Fellows, Selly Oak, Worcestershire, E. Jones, Deepfields, Sedgley, and W. Brown, Smethwick, Staffordshire—Imp. in the manufacture of nails, railway spikes, or pins, and gas tube fastenings, and in machinery employed in the said manufacture.
841. R. B. Greenwood, 5, Durham place East, Hackney-road—Imp. in candlesticks and candleholders.
842. W. Edwards, Wolverhampton—An imp. or imps. in the manufacture of shoes for horses and other beasts of draught and burden, and in the preparation of the metal to be used for this purpose.
843. W. E. Newton, 66, Chancery-lane—Imp. in breech-loading fire-arms. (A com.)
845. A. Steuart, 144, High-street Croydon—Imp. in capstans.
846. J. Dunn, Preston—Imp. in machinery or apparatus for slubbing, roving, spinning, and doubling cotton and other fibrous materials.

847. J. Hutson, Richmond—Imp. in the manufacture of posts and joints or connections of bedsteads and other articles of furniture.

Dated 6th April, 1861.

848. J. Down, Alderley Edge, Cheshire—Imp. in treating certain ores and alloys, and in obtaining products therefrom.
849. W. Slater, Bolton-le-Moors, Lancashire—Imp. in machinery for preparing and spinning cotton and other fibrous substances.
851. B. Knowles, Birmingham—Imp. in the manufacture of papier maché blank trays.
852. J. Knight, 8, Crown court, Chancery lane—Imp. in the manufacture of baths and trays and other vessels for photographic purposes, which imps. are also applicable in the manufacture of galvanic battery and other galvanic chambers or cells, and other vessels to contain chemical solutions.
853. T. G. Ghislin, 72, Hatton-garden—Preparing, applying, and adapting certain vegetable productions called "Eiklonia-buccinalis, Proteaceæ, Juncus Serratus, Juncus Trista, and Armyllideæ, to further new purposes of manufacture, and certain modes to effect the same.

Dated 8th April, 1861.

855. W. Smith, Derby-street, Birmingham—An imp. in the manufacture of umbrellas, parasols, and other similar articles.
856. W. E. Gedge, 11, Wellington-street, Strand—Imp. in the construction of ceilings and partition and other walls. (A com.)
857. H. Debeselle, Thimistre, Belgium—A rotatory cone, being a new application of the centrifugal force to the purpose of raising and propelling fluid bodies.
858. H. Wilde, Manchester—Imp. in electro-magnetic telegraphs, and in apparatus connected therewith.
859. J. Clark, Glasgow—Imp. in apparatus for feeding or supplying paper or other like material, to ruling, embossing, printing, and similar machines, and in certain parts of embossing apparatus.
861. A. Shanks, 6, Robert-street, Adelphi, Westminster—An improved washing machine.
863. W. Clayton, Waterloo-road, Dublin—Imp. in fire-escapes.
864. R. A. Brooman, 166, Fleet-street—Imp. in apparatuses for turning over leaves or sheets of music and other like sheets. (A com.)

Dated 9th April, 1861.

865. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in machinery for dressing and cutting stone. (A com.)
867. H. G. Prosser, Waterford—Imp. in the method of, and apparatus for, preventing the deterioration of grain when deposited in the holds of vessels for shipment, and also in the application of the said method and apparatus to vessels engaged in shipping grain from one port to another.
868. W. H. Beddall, 104, Fleet-street—Imp. in apparatus for discharging and distributing the contents of teapots, coffee pots, or other vessels.
869. C. Gill, Newington, Surrey—Imp. in the construction of swivels, hooks, or other similar connecting instruments, for chains, jewellery, and other articles.
870. W. H. Phillips, Nunhead, Surrey—Imp. in the combustion of fuel for generating steam and for other purposes.
871. W. Westbury, Aston, near Birmingham, and E. Cooke, Smethwick, Stafford—A new or improved fastening, which said fastening is applicable to the fastening of windows and also to the fastening of belts, garters, braces, and other articles of dress.
874. W. Wood, Birmingham—Imp. in breech-loading fire-arms and ordnance.
875. W. E. Newton, 66, Chancery-lane—Improved apparatus for drawing bolts. (A com.)
876. F. Taylor, Romsey, Southampton—Imp. in apparatus for receiving, drying, and deodorizing human excrement.
877. F. Ransome, Paris—Imp in the manufacture of artificial stone and cement or plaster, and in treating timber for the purpose of preserving the same.

Dated 10th April, 1861.

882. A. V. Morel, Paris—An improved safety lock.
884. J. Caw, jun., Halifax—Imp. in the manufacture of metallic cords suitable for "crinoline," blind cord, bell pulls, suspending pictures, laces, and for other purposes.
886. T. Taylor, 7, Wellington-row, Bethnal-green—Imp. in machinery for the manufacture of chenille and other circular pile fabrics.

Patents Sealed.

[*From Gazette*, 19*th April*, 1861.]

April 19th.

2398. W. E. Newton.
2570. C. G. Russell.
2571. R. A. Brooman.
2574. J. Wadsworth and J. Wadsworth.
2582. R. Baynes.
2584. C. Lungley.
2588. G. Lacaire.
2590. E. K. Dutton.
2591. D. Allison and J. Kay.
2594. J. McInnes.
2597. J. Chisholm & G. Chisholm.
2600. W. Prosser & H. J. Standly.
2602. J. Kay, J. Hartley, and T. Mallinson.
2603. W. Mann.
2606. W. C. Cambridge.
2632. J. Ashby.
2633. W. Clark.
2637. N. Brough and G. T. Kilby.
2638. T. Wilson.
2648. W. Clark.
2659. A. L. Chéradame and J. B. A. Lambert.
2674. W. E. Newton.
2701. W. Edwards.
2754. G. Simpson.
2759. C. Stevens.
2764. W. C. Forster.
2784. Luigi Saccardo.
2804. W. H. Ralston.
3106. T. L. Preston and T. Lloyd.
1. E. Tomlinson.
208. C. Bishop.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, April* 19*th*, 1861.]

April 15th.

822. A. H. A. Durant.
982. C. Schleicher.

April 16th.

845. J. H. Johnson.
848. J. G. Jennings.
856. M. Rowan and T. R. Horton

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, April* 19*th*, 1861.]

April 17th.

890. J. Bernard.
891. J. Bernard.

[*From Gazette, April 23rd*, 1861.]

April 23rd.

2607. W. Hodson.
2618. W. Syrett.
2619. E. F. Prentiss.
2620. C. Hathaway.
2623. J. Burch and E. Booth.
2624. E. Booth and M. Booth.
2625. W. Mabon & W. P. Gaulton.
2626. T. Smedley.
2630. E. K. Dwyer.
2631. F. H. Elliott.
2647. C. Crockford.
2684. J. Leonard and B. Lorentz.
2700. G. Hinton.
2713. M. R. Leverson.
2721. W. Birks, sen., and W. Birks, jun.
2791. W. Robertson and J. M. Hetherington.
2845. A. V. Newton.
341. W. E. Newton.
455. R. Mushet.
473. R. Mushet.
491. R. Tiernan.

[*From Gazette, April 23rd*, 1861.]

April 18th.

854. H. Edwards.
860. E. Derogy.
864. R. Peacock.
882. S. Clegg.
883. J. Chatterton.
938. D. E. Hughes.
1013. W. E. Newton.

April 19th.

876. J. Horsey.
877. E. Green and E. Green, jun.
892. J. B. Paddon.
897. C. Atkinson.
937. W. E. Newton.

April 20th.

866. J. B. Smith.
890. P. E. Aimont.

[*From Gazette, April 23rd*, 1861.]

April 18th.

2535. W. Crosley.

April 19th.

927. T. F. Finch.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietors' Name.	Address.
4336	Feb. 13.	Block of Black Lead	Edward James	Starch and Rice Mills, Plymouth.
4337	,, 19.	Rolled Metal for Heels or Tips for Boots and Shoes	Hartshorne and Ward	Queen's-cross, Dudley.
4338	,, 21.	The Foresight Protector	Stephen William Silver and Co.	66 and 67, Cornhill, and 3, 4, 5, and 6, Bishopsgate-street Within, E.C.
4339	,, 22.	The Cavour Knife Sharpener	John Lingard	Wharncliff-side, near Sheffield.
4340	,, 27.	The New Side Fastening Boot	John Henry Glew	19, Howland-street, Fitzroy-square, W.
4341	March 1.	Auger Nose	Charles Warburton	63, Broad-lane, Sheffield.
4342	,, 1.	An Improved Riddle or Sieve	Joseph Nicholas, jun.	Cheapside, Birmingham.
4343	,, 1.	Bottle Rack	Farrow and Jackson	18, Great Tower-street, E.C.
4344	,, 4.	The Hygienic Corset	Edward Brimble	16, Old Change, E.C.
4345	,, 4.	Stopper for Bottles or Jars	The Yorkshire Bottle Company	Victoria Wharf, Earl-street, Blackfriars, S.
4346	,, 9.	Draught Screen for Doors	John Fredrick Simmonds	7, Melton-street, Euston-square, N.W.
4347	,, 12.	Miniature or Device Brooch	Albert Lewis Woolf	Birmingham.
4348	,, 26.	Improved Frame and Fastening for Purses and other similar articles	Christian Weintraud, jun.	Offenbach-on-the-Maine.
4349	,, 27.	Plug for Glass Taps	George Wilson	York.

Journal of the Society of Arts.

FRIDAY, MAY 3, 1861.

INTERNATIONAL EXHIBITION OF 1862.—GUARANTEE DEED.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others who take an interest in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £393,000, have already been attached to the Deed.

GUARANTEE FUND FOR THE EXHIBITION OF 1862.

The following additions have been made since the last announcement, in the *Journal* for April 26 :—

*** *The names marked with an asterisk are those of Members of the Society of Arts.*

NAME.	AMOUNT.	REPRESENTING THE OBJECTS OF THE SOCIETY—ARTS, MANUFACTURES, AND COMMERCE.
Charles Finch Foster, Mayor of Cambridge	£1,000	Arts.
William Mc Cormick, M.P., 10, Cambridge-terrace, Regent's-park, N.W. ...	2,000	Arts.
*Elkanah Healey, Oakfield, Gate-acre, near Liverpool	100	Commerce.
Boord, Son, and Beckwith, Bartholomew-close, E.C.	500	Commerce.
George Wright and Co., Burton Weir, Sheffield	500	Commerce.
*Joseph Underwood, 5, Hyde-park-gardens, W.	1,000	Commerce.
James Ferrabee and Co., Phœnix Iron Works, near Stroud	100	Manufactures.
Puer and Hall, Hyde Foundry, Bury	1,000	Manufactures.
W. S. Shove, Lee-terrace, Lee, S.E.	500	Arts.
J. R. Losada, 105, Regent-street, W.	200	Commerce.
F. Robinson, 7, Parliament-street, S.W.	300	Arts.
Edward Cottam, 7, Parliament-street, S.W.	300	Commerce.
*Charles Nightingale, 64, Wardour-street, W.	250	Commerce.
J. M. Johnson, 3, Castle-street, Holborn, E.C.	100	Commerce.
*Pliny Miles, 169, King's-road, Chelsea, S.W.	200	Commerce.
Henry Solomon, Houndsditch, E.C.	250	Commerce.
Cottam and Co., 2, Winsley-street, W.	300	Commerce.
Robert Pike, St. Aldate-street, Oxford	100	Arts.
James Hughes, 9, Crescent, Oxford	100	Arts.
The Oxon Wine Co., Oxford	100	Commerce.
Standen and Co., 5, Park-street, Oxford	100	Arts.
Henry Hatch, Park Town, Oxford	100	Arts.
Joseph Round, 33, Beaumont-street, Oxford	100	Arts.
*James M. Venning, 7, Petersham-terrace, Queen's-gate, W.	100	Arts.

By Order,

P. LE NEVE FOSTER, *Secretary.*

ARRANGEMENT OF MINERALS AND MINERAL MANUFACTURES IN THE EXHIBITION OF 1862.

The following is the reply of Her Majesty's Commissioners to the Memorial from owners of mineral property, producers of minerals, mineral manufacturers, and others, published in the *Journal* for the 19th ult., page 398 :—

Offices, 454, West Strand, London, W.C.,
April 24th, 1861.

Sir,—Her Majesty's Commissioners for the Exhibition of 1862, direct me to acknowledge the receipt of your letter of the 15th instant, and of the memorial sent therewith.

I am to inform you in reply that the Commissioners are glad to observe the interest which the memorialists, representing various mineral productions of South Wales, take in the arrangement of the Exhibition.

But before any plan for the actual arrangement of objects in the Exhibition building can be determined on, it is indispensable that the Commissioners should be informed, by foreign countries and British colonial exhibitors, what are the precise classes of objects to be exhibited, and what space they are likely to occupy. The experience of the Exhibition of 1851, and of the Paris Exhibition of 1855, shows that there are great difficulties in obtaining such information from foreign countries and exhibitors in the Colonies until a very late period. Moreover any plan of arrangement must not only be possible of accomplishment within a short period, but must be one which the exhibitors would be willing and able to execute on their own behalf.

The Exhibition throughout is a voluntary and self-supporting work, and it is essential to success that nothing should be attempted which is not likely to receive the heartiest co-operation of the exhibitors.

The Commissioners do not apprehend that any official rules will prevent the memorialists from giving effect to their own wishes of exhibiting specimens of like minerals together for the purposes of comparison, and of accompanying them with illustrative manufactures, models, diagrams, &c. Such a work must, however, be done by exhibitors themselves. The Commissioners will be glad to hear that the proprietors and workers of copper mines, for example, have entered upon some united course of action for exhibiting samples of copper from all parts of the United Kingdom in a systematic series, and of inducing coppersmiths and other manufacturers of articles produced from copper to exhibit their manufactures in juxta-position, and in illustration of the employment of the raw material.

Should it not be practicable to induce manufacturers thus to give up their manufactures for the purpose, another course would be for the mineral producers to furnish the manufacturers of copper goods with samples of the raw materials, and to induce them to place the samples with the manufactures. It will be obvious, however, that as the manufacturers in copper may be more numerous than the producers of the raw material, it would not be necessary that each manufacturer should exhibit raw materials obtained from similar sources. All such mutual arrangements, however, must be voluntary, and must be organized independently of the direct action of the Commissioners, who, whilst they will be happy to afford any assistance in their power, cannot enter on the cost or responsibility of making them.

In the Paris Exhibition the productions of the larger exhibiting nations were separated in four or more places in the buildings. For example, the machinery of all countries (with some exceptions, however) was brought together; so were the chemical manufactures, minerals, &c. The Commissioners hope they will be able to adopt and even extend the same principle in the Exhibition of 1862, without impairing the highly interesting features which arise from national groups. How far it may be possible to carry out this principle must be determined after the wishes and intentions of the foreign countries and the British Colonies are known, and the early information they may afford to the Commissioners.

The Commissioners are preparing a list of the different producers and manufacturers in the United Kingdom, who will be arranged according to the classes of the Exhibition which have been already published, and as soon as this list is ready copies shall be sent to the memorialists.

I am, sir,

Your obedient Servant,

F. R. SANDFORD, Secretary.

Alexander Williams, Esq., &c., &c., &c., Neath.

CONVERSAZIONI.

The Council have arranged for two Conversazioni during the present Session; the first to-morrow, Saturday, the 4th of May, at the Society's House, the card for which will admit the Member only; the second on Saturday, the 1st June, at the South Kensington Museum, the card for which will admit the Member and two ladies, or one gentleman.

Cards for both these Conversazioni have been issued. Any member not having received them should communicate with the Secretary.

Secretaries of Institutions in Union, who may receive applications from any of their members desirous to attend either of these Conversazioni, can have a limited number of cards placed at their disposal on application to the Secretary of the Society of Arts.

EXHIBITION OF PICTURES BY THE LATE JOHN CROSS.

The promoters of the subscription fund for the purchase of one or more of the unsold works of the late John Cross, the author of the picture, "The Clemency of Cœur de Lion," in the New Palace of Westminster, have accepted the permission of the Council of the Society of Arts to exhibit, in the Society's Great Room, the works and sketches of that lamented artist, where they may be seen during the present month.

The subscription (which now approaches one thousand pounds) will be appropriated to the purchase of one or more of the three great works unsold now exhibited in the Society's rooms, for presentation to some public Institution or Institutions, as a tribute of memory to the artist, and as a means of rendering assistance to his widow and children, otherwise unprovided for.

Subscriptions will be received, during the exhibition of the pictures, by the Secretary of the Society of Arts; or by E. B. Stephens, Esq., Hon. Sec. to the Fund Committee, 27, Upper Belgrave-place, Pimlico, S.W.

The following are the pictures that have been collected for exhibition:—

1. Murder of Thomas à-Becket, Archbishop of Canterbury, Dec. 29th, 1170-71. Painted in 1852.

2. Small repetition of the same (unfinished).

3. Lucy Preston's Petition, A.D. 1690. Small copy (unfinished).

"Lucy did not reply; she only raised her eyes, with an appealing look to the Queen, and then turned them expressively on the portrait of King James, opposite which her Majesty was standing."

4. Original Sketch for the same.

5. Photograph from the original Picture, painted, 1856.

6. Chalk Studies for "the Clemency of Cœur-de-Lion." (No. 16.) Westminster Prize Picture, 1847.

7. Last Sketch by the Artist in Charcoal, an intended Picture for the Exhibition of 1862. Incident in the life of Wickliffe, A.D. 1379.

8. Sketch from Mr. Cross' residence, Montmartre, Paris.

9. Photograph-portrait of the late John Cross.

10. Sketch for the Picture, "Edward the Confessor leaving his Crown to Harold." Painted for Sir S. Morton Peto, Bart., M.P., 1851.

"On the other side it is maintained, with equal confidence, that he named Harold his successor, and told the chiefs and churchmen that no one was so worthy of the crown as the great son of Godwin."—*Knight's History of England.*

11. Sketch for the Picture—Harold's Oath to William. Painted for Sir S. Morton Peto, Bart., M.P., 1851.

"Harold, who it is said was thus publicly taken by surprise, durst not retract; he stepped forward, with a troubled and confused air, laid his hand upon the book, and swore. As soon as the oath was taken, at a signal from the Duke, the missal was removed, the cloth of gold was taken off, and the large tub was discovered filled to the very brim with dead men's bones, and dried-up bodies of saints, over which the son of Godwin had sworn without knowing it. According to the Norman chroniclers, Harold shuddered at the sight."—*Knight's History of England.*

12. Proof print of the Clemency of Cœur-de-Lion. (No. 16.) Engraved by Shenton, after Cross.

13. First idea for this picture. (No. 16.)

14. Chain Armour, made by the Artist for his great picture. (No. 16.)

15. Original Sketch for the Burial of the Princes in the Tower.

16. Death of Richard Cœur-de-Lion, A.D. 1199.* This picture, exhibited in Westminster Hall, 1847, was awarded a prize, and purchased by the Royal Commissioners of Fine Arts. It is now the property of the nation, and was lent for this Exhibition by the Right Honourable the Chief Commissioner of Public Works.

17. Burial of the Princes (sons of Edward IV.) in the Tower, 1485. Painted, 1850.

18. Coronation of William the Conqueror. Painted, 1858.

"On the Conqueror being proclaimed King, the loud shouts of the English and French were mistaken for hostile tumult, and the Normans, thinking the whole population of London had risen against them, fired the near English houses, &c. Meanwhile, William, though trembling from head to foot, and left almost alone in the church, or with none with him save the Archbishop Aldrid and a few pale panic stricken priests, all clustering around the altar, most resolutely refused to postpone the celebration, and held the crown of England in his grip, as though no mortal man should ever wrest it from him."—*Knight's History of England.*

19. First Sketch for the above Picture.

20. Photograph from the above Picture.

THIRTEENTH ANNUAL EXHIBITION OF INVENTIONS.

The Exhibition was opened on Monday, the 1st of April, will remain open every day until further notice from 10 a.m. to 4 p.m., and is free to members and their friends. Members by ticket, or by written order, having their signature, may admit any number of persons. Members of Institutions in Union with the Society are admitted on showing their cards of membership.

TWENTIETH ORDINARY MEETING.

WEDNESDAY, MAY 1, 1861.

The Twentieth Ordinary Meeting of the One Hundred and Seventh Session was held on Wednesday, the 1st inst., Peter Graham, Esq., Member of the Council, in the chair.

The following gentlemen were proposed for election as members of the Society:—

Arundel, John	Clapham-park, S.; and 1, Gutter-lane, Cheapside, E.C.
Crawfurd, John, F.R.S.	21, Wilton-street, S.W.
Fisher, Charles	Whitehaven.
Sedley, Angelo James	40, Langham-street, Portland-place, S.W.
Simpkinson, Francis	67, Victoria-street, Westminster, S.W.
Sone, John	23, Fenchurch street, E.C.
Sworder, Thomas	Bedford-road, Luton.

The following candidates were balloted for and duly elected members of the Society:—

Buncombe, Charles Hope	4, York-place, Mile-end, E.
Chanter, Thos. Burnard	Bideford.
Dalziel, George	9, St. George's terrace, Regent's-park, N.W.
Denham, Wm. Graham	48, Kent-street, Southwark, S.E.
Girdwood, William	Old Park, Belfast.
Ramsden, James	Abbot's Wood, Ulverstone.
Rouch, Wm. White	180, Strand, W.C.
Schneider, H. W.	17, Gracechurch-street, E.C.
Smith, Augustus	Wentworth-street, N.E.
Whetham, Charles	52, Gordon square, W.C.; and Bridport, Dorset.

The following Institution has been taken into Union since the last announcement:—

Notting Hill, Working Men's Association.

The Paper read was—

FILTRATION AND FILTERING MEDIA.

By JULIUS G. DAHLKE.

In the observations which I shall have the honour of addressing to this Society, upon Filtration and Filtering Media, I propose to deal with the subject in a popular and practical manner, rather than to treat it in an abstract and exclusively scientific spirit. But, before entering upon it, you will permit me to say that, having been but a short time resident in England, I have not yet succeeded in sufficiently conquering the difficulties of the language, so as to express myself as clearly as is desirable. Errors in phraseology and pronunciation will therefore occur; but with the usual generosity of Englishmen, you will remember my actual position and grant the indulgence of which I shall stand in so much need.

From various modern works upon the civilisation of the Egyptians, Chinese, Japanese, and other ancient oriental nations, we learn that at a very early period filters were used by them. These appear to have been vessels made of unglazed earthenware, or of porous stone. There is no evidence to show either that they were acquainted with the true nature of those matters which should be separated from water intended for the use of man; or that they had studied the subject of filtration in a scientific spirit. In this neglect Europe imitated them until near the close of the seventeenth or beginning of the eighteenth century, when the French began to pay attention to the subject, and employed silk, wool, cotton, sponge and sand, as their filtering media. But about the middle of last century a lias was discovered in Picardy, which, owing to its effective action, came largely into use. The mode of using it was particularly simple, being in the form of a false bottom placed in the cistern, through which the water descended. Afterwards, the attention of Englishmen was directed to the subject, and about 70 years ago filters were introduced which contained three layers of media, viz., sand, gravel, and charcoal. These were for filtering by descent, but another system was subsequently adopted and patented for filtering by ascent; this, however, was complicated, and never became in any way largely known.

The French seem to have resumed their lead by improving their apparatus; still, however, and although many alterations were made, and minor improvements introduced, nothing of any consequence was effected until very recently, when another body of persons again took up the subject in England, where filtration is now very commonly adopted.

The same media have been employed in various ways; the chief modern efforts in the way of effecting improvements having been, with only a few exceptions, rather artificially to increase the pressure, and so to increase the rate of filtration, than to improve the character of the media employed.

The multitude of recent inventions in connection with filtering apparatus is so great that it would occupy far too much time for me to mention them. It is sufficient to say that there is hardly a porous substance in existence which has not been employed for filtering purposes. At one time, wool and cotton were the filtering agents most widely adopted, but their use was abandoned, because, after being exposed to moisture, they undergo decomposition. Asbestos cloth has been proposed as a substitute for them, but it does not appear to have found much favour.

* Richard is supposed to be lying on the bed of Vidomar Viscount de Limoges, whose Castle of Chalus he has taken by storm.

During the past seventy years, gravel, sand, and charcoal, used as a mixture, have been the agents most in vogue amongst filter makers, and it is only lately that due attention has been paid to charcoal as the most efficient filtering medium. Its use is much more frequent now, because not only has it a powerful detergent effect, but it possesses also the peculiar advantage of not becoming foul, while it protects from decomposition other bodies in contact with it.

It has been often asked why animal charcoal is so effective as a filtering medium? Some attribute this to the presence of so much carbon; but that this is an insufficient reason, is shown by the fact that, although coke contains more carbon than sand, yet it is not superior as a filtering agent.

Animal charcoal filters about three and a half times more rapidly than either coke or sand, while it is also greatly superior in this, that it removes many inorganic impurities held in solution, over which the former substances exert no power.

It appears that the more porosity a filtering medium possesses in itself, the more rapidly does it filter, and the greater is the effect it produces on the water. The latter will be still more decided when, with a greater porosity, peculiar substances are combined.

This leads me to believe that we may attribute the extraordinary filtering quality of animal charcoal to the fact that its principal component parts are lime and carbon, so combined as to secure a wonderfully fine porosity. Vegetable charcoal, although very porous, and containing far more carbon, has less effect on water.

I have observed that another substance, of which I shall presently speak, and which (although of an entirely different origin) possesses great similarity in this respect, may in many cases be successfully substituted for animal charcoal. Indeed there are doubtless numerous substances and compounds which may be used with as great effect. Do we not see that nature supplies the most beautiful waters from limestone beds? It is hardly necessary to say, could we but imitate her action, that we should be able to do more in this as well as in other things, but we must content ourselves with as much success as our defective knowledge of her laws will permit us.

Although we know of powerful agents for the removal of different impurities from water, circumstances may and do interpose which render it extremely difficult to obtain the medium in the requisite form for our purpose, and there is nothing yet discovered which will perfectly meet all the requirements of the case. Those who assert that it is possible to construct an apparatus to act as a universal filter for purifying any kind of water effectively, whatever may be the impurities, remind me of the vendors of certain patent medicines, who vaunt their nostrums as capable of curing every disease. Their claims are about equally trustworthy.

I should classify the art of filtration into three systems, viz.:—1st, where the action takes place simply on the surface of the filtering medium; 2nd, where the whole bulk of the filtering medium is calculated to operate on the water, and the detergent effect in its most delicate form may be produced; and, 3rd, where both of these systems are conjointly employed.

The first system requires a filtering medium of such a fine porosity that its pores must be smaller than the minute particles composing the impurities suspended in the water. Such an agent of course must sooner become clogged than a filtering medium of coarser porosity, and which is meant to act with its whole bulk on the water. But both systems employed together may prove to be useful in several instances, as in the case of domestic filters. The greatest failing of these is that they must become clogged, and the more they are liable to this, the more effectively they act. We often hear of self-cleansing domestic filters, but the fact is that no invention of the kind has been made yet, without involving complications too great for the purposes of ordinary domestic use.

However, it is not difficult to make a filter for general domestic purposes—although the effective self-cleansing of such an apparatus is still a problem to be solved.

If the filtering medium employed in this case be solid, and of a fine porosity in its upper part, the clogging impurities will not only be retained on the surface, but may be easily removed by scraping; and then, if the lower part of the filtering medium be prepared of a material capable of producing a detergent effect, it will act the more readily through not being interfered with by the rougher and clogging impurities.

It should be remembered, too, that in most cases we have here only to deal with some rougher impurities which have found their way into the water on its passage from the waterworks, or other source, to the tap of the consumer.

Being deeply interested in the subject of filtration, I have never omitted an opportunity of carefully inspecting those house cisterns which came under my observation; I have, however, seen but few to which the attention necessary to secure the due cleansing had been paid. Most of them were loaded with mud, and in some of them I actually noticed the growth of vegetation (fungi). I conclude, from my observations, that hardly one-fourth of the house cisterns in London are in such a condition as to afford the consumer a supply of wholesome water like that which flows from the main.

The difficulty, or I may say the impossibility, of keeping water which is stored in cisterns entirely free from accidental contamination, should lead us to provide a domestic filter capable of removing chemical impurities, as, for example, any lead which may be held in solution; in fact, the practice of filtering water preserved in cisterns and intended for domestic use cannot be too warmly recommended.

To remove lead from water, Professor Faraday recommends the practice of stirring up animal charcoal with the water so contaminated, the same being then allowed to settle. I have found, however, that, by using this material in a manner to be described hereafter, I never failed in producing the same effect by means of filtration.

It is easy enough to purify small quantities of water, but the greater the quantity the greater are the difficulties of purification, especially when a certain chemical effect has to be produced.

It will not be necessary for me to dwell upon the filtering processes required for large water-works, as the supply is generally taken from such sources that the common sand filter-bed answers the purpose; and where the water is too hard for domestic uses, the beautiful process of Dr. Clark will meet and remedy the evil.

Experience shows that it is not prudent to adopt the same means of purification for every kind of water, and I should make a difference in the treatment of the water used for domestic and that employed for manufacturing purposes. In the latter it will be often of the greatest importance to have the water as pure as possible, whereas certain so-called impurities in water may not be at all injurious to health. When we consider that no one would call human blood impure which contained 420 grains of saline matter per gallon, I do not know that we are justified (of course, speaking in relation to health) in calling water impure which contains small quantities of certain saline matters, particularly when we have no medical evidence that the small portions of them drunk in such water ever did any harm. Besides which, it should be remarked that the quantity of lime and magnesian salts drunk in water must be greatly exceeded in amount by that which enters the system in the food.

Only those waters which contain much sulphate of lime and magnesia have been observed to derange the process of digestion—as for instance, the waters of the New Red Sandstone.

Too pure water is distasteful, and unfitted for drinking purposes. In a case which came under my observation, the water taken from a certain well, having a flat and disagreeable taste, proved on analysis to be remarkably free from impurities. In order to make this water more fit,

or perhaps only more agreeable for use, I made such arrangements, that before it was filtered through a body of animal charcoal, some finely-dissolved organic impurities were added to it, and which were of course acted upon by the charcoal. I found that the mixed water had a pleasant taste after filtration, and even that it was somewhat sparkling, though I failed to recognise any difference in the unmixed water after it had passed through the same filter.

There are cases where no good sources are available, and waters of all kinds must be used; it may therefore be perhaps of some interest to illustrate such a case; but before doing so I shall make a few remarks as to the nature of the filtering media which I prefer to employ.

Solid filtering media have great mechanical advantages; however, I do not contend for their exclusive use, as I find it often advantageous to have loose filtering media employed conjointly with solids.

Experience has convinced me that we could not employ a more powerful and efficient filtering medium than pure animal charcoal, in a well-regulated, fine, porous, and solid state. Unfortunately, however, no method has yet, to my knowledge, been discovered by which this substance can be moulded into a convenient shape without diminishing more or less its filtering qualities. What is required is some material which will bind the particles together without glazing them.

Attempts have been made to produce solid animal charcoal filters by moulding the charcoal with the aid of bitumen and carbonising the latter; but it appears that the object in view cannot be arrived at in this way. In the first instance, as the proper consistency is not gained; next, by becoming glazed the charcoal loses many of its good qualities, and, at least, its rapidity in action will be diminished from its becoming less porous.

Another serious objection to this medium, which is really a mixture of charcoal and coke, is to be found in the fact that the filtering power of charcoal stands to coke as 15 to 4.

Mineral bitumen (*i.e.*, coal-tar and coal-pitch) will produce this fatal defect in a higher degree than vegetable bitumen, as it leaves more solid residue after carbonisation; but animal charcoal will not adhere to it, and will not bind sufficiently, even when a great quantity of it is used, unless some vegetable charcoal is added. This in itself might not be looked upon as a great drawback,—although it has not the filtering quality of animal charcoal—if it served to preserve the latter from the glazing effects of the carbonized bitumen, but it does not do this.

Many well-known solid filtering media are used, but it is with them as with every other article in the market, some are very good and highly commendable—others less so, much of course depending upon the manner in which they are used, and the special purpose for which they were intended.

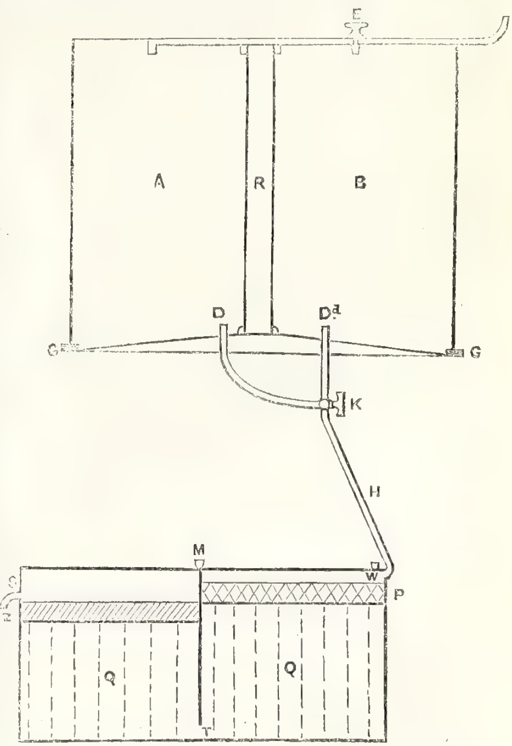
I will now describe a composition which I have used with much success, but before doing so, I beg it may be distinctly understood that it is not my intention to place it above all other compositions, or to question the utility of similar filtering media.

From the fact that the porosity of charcoal is greater than that of any other filtering agent, it is obvious that I should wish to employ it in my solid medium in as great a quantity as possible. However, finding, as I have stated before, that it is impossible to make it into a solid body without impairing its quality, I tried to discover a material which could be used as a substitute for it. Being in some degree familiar with the use of the residue which the Torbane-hill mineral, sometimes called Boghead coal, leaves after distillation, I turned my attention to it. After some experiments, I found that this substance, when moulded with bitumen, ceased to be effective, as is the case with animal charcoal. I, however, eventually discovered that this material, when saturated with oily or fatty matter, will easily adhere by the addition of a comparatively small quantity of clay, and can so be readily moulded. When well burnt, this mixture furnishes a very powerful filtering medium; it will remove colour and smell from water, and will reduce its hardness considerably, while at the same time its rate of filtration equals that of charcoal. In fact, recent discoveries have led me to the belief that the residue of the Torbane-hill mineral alluded to, deserves more attention than has hitherto been paid to it, for it appears to possess many valuable properties which have been vainly sought in other bodies; but having not yet finished my researches, I must confine myself on this occasion to speaking of it merely with regard to its application to filtering purposes.

To make the mixture more effective, I add to it bone-dust, not only for the sake of the animal charcoal, but because it must necessarily shrink in the charring, an effect which enables me to regulate with great nicety the porosity of the filtering medium beforehand; for I find that the porosity of the mixture mainly depends upon the quantity and grain of the bone-dust which enters into its composition. I have also found that the use of oil instead of water for moistening the clay, prevents the too great shrinking of the moulded mass in the drying and firing process.

By means of the process just described, I can produce filter-blocks of considerable size and of various shapes, by the use of which I am enabled to overcome a great many difficulties, and to work large quantities of water with a comparatively small filtering apparatus.

Supposing 5,000 gallons of water are daily required to be purified, that the water supplied contains 9 grains of organic impurities per gallon, has a bad smell, is highly coloured, and is of 17 degrees of hardness, I should employ an apparatus of which a woodcut is given.



The upper part is a tank, made from slate, completely closed, and is divided into two compartments by means of a solid filter-block with one inlet and one outlet for each of them. The supply-pipe is provided with a three-way cock (E), which allows the necessary arrangement to be made for admitting the water to one compartment of the

tank, and for causing it to pass into the other through the filter-block. If, for instance, it enters at A, it has to pass through R into B, flow off by Dd, and through K and H into the second apparatus.

This tank, being only intended to free the water from the rougher and clogging impurities, its action is to be reversed as often as may appear necessary in order to remove the collected sediment. This is easily done by shutting off the supply-pipe for A, and opening that for B; but before the water is allowed to enter the connecting pipe of the second apparatus, the accumulated impurities must be removed through the opening of the corresponding plug G, and, that it may flow off easily, the bottoms of the two compartments are inclined towards the plugs.

The two walls of the tank which face the filtering medium, are so fixed, that they can be opened from time to time, in order that the surface of the filter may be scoured, it being of such a consistency that its surface can be easily abraded by rubbing with hard stone.

The water is thus freed from its coarser organic impurities, so far that they cannot possibly clog the second apparatus, which is thus retained almost entirely for chemical action on the water. It consists of a vessel which is also completely closed, with one inlet (W), and one outlet (S), divided from M to T, and fitted in the following manner:—P is a solid filter-block, cemented into the apparatus and covering the whole surface of the body Q, thus forming the top part of this filter; it is of much finer porosity than the filtering-block in the tank, in order to separate the finer particles of organic matter from the water. The space Q is filled up with coarse granular charcoal and a preparation of the Torbane-hill mineral spoken of, intended to operate upon the water so as to remove those matters held in solution, which impart colour, smell, and hardness. Z is a solid filter-plate, of a more neutral character, also cemented into the vessel to hold together with P, the packing of the apparatus.

The reason why the two materials which fill Q are employed in a rather coarse grain, is, because the oxidation of several of the impurities taking place during the filtering process, will produce considerable quantities of gases which would soon accumulate in a finer medium and interfere with the rate of filtration, wherefore I rather prefer employing the mixture in a thicker layer.

The dimensions of the apparatus, and the different filtering media employed in this case, will be 3 feet square by 4 inches in thickness for the filter-block in the tank; each compartment of apparatus No. II. to be 18 inches high by two feet square (internal measure); its fittings are: the plate P, 3 inches thick, Q, 2 feet, and Z, 3 inches.

The first clogging in Apparatus No. II. will take place on the surface of P, which can be easily avoided by removing the corresponding cover of the vessel, and rubbing the surface of P with a piece of hard stone, to which it will slowly yield, and thus be easily freed from its clogging matters, which cannot penetrate into it, the porosity of the filter-cake being too fine.

The filter-block in the tank is so fixed that it can be taken out and replaced without much inconvenience, should it become worn out.

The apparatus thus arranged is calculated for not less than 12 feet pressure, and its effect on such water as we supposed to have for illustration will be as follows:—Organic impurities reduced to about half a grain per gallon, no trace of smell or colour remains, and its hardness is reduced to about 7 or 8 degrees.

With regard to the continuance of the chemical effect, I admit that this must have its limits; however, from the fact that the rougher clogging impurities are so easily removed from the apparatus, and that the quantity of the inorganic impurities which will be absorbed must necessarily be comparatively small, a good portion of them escaping in the form of gas, I do not hesitate to assert that it can be successfully employed, for a considerable time, before the filtering agents get exhausted, and repacking is required.

I do not believe it would be possible to work such a quantity of water so effectively and lastingly in such a small apparatus, if the whole of the filtering medium were to be used in a loose state, as its porosity in the latter case could not be condensed to the state of fineness required.

This apparatus being only meant to serve for the special purpose I spoke of, it is obvious that it will have to be altered according to circumstances, both as regards the filtering agents to be employed, and its mechanical arrangements.

If the quantity of water to be filtered be so great that a very large filter-bed is required, I prefer employing the preparation of the Torbane-hill mineral, as described in a granular state, rather than sand; for this reason, that it filters more than three times as quick, and is five times as light as the latter; consequently a ton of it will, by a layer of equal thickness, filter about 16 times the quantity of water that a ton of sand would filter, with the advantage that the filtering would produce at the same time a greater decolorising effect and a considerable softening of the water. A clogging from the precipitation of chalk is not likely to take place, as this substance is separated in a crystalline and granular state. Moreover, those particles of the material which become saturated with organic impurities may, through calcination, regain the greater part of their former efficiency.

I may remark, in conclusion, that filtration is not often resorted to on the Continent, with the exception of France and Holland. Manufacturers are very much afraid of adopting any improvements that demand an outlay of capital, and so in this case they will often prefer using impure water to spending their money upon apparatus for purifying it.

As for the water used for domestic purposes in Germany, the people are so apt to look up to a paternal government, even in matters concerning their health, that they never think of purifying the water supplied to them. To this apathy of the public may be ascribed in a great degree the comparative failure of the English water-works at Berlin.

DISCUSSION.

Mr. Spencer would not have intruded any remarks upon the meeting had it not been that he considered that the precepts laid down by Mr. Dahlke in his paper and his practice did not coincide. He (Mr. Spencer), having been informed that Mr. Dahlke's filters contained charcoal as the filtering medium, had the curiosity to break one of them open, when he found it to contain about one inch and a half of charcoal, with about 10 per cent. of magnetic oxide of iron. They had thus heard a description of a filtering medium with the principal element omitted—viz., the magnetic oxide of iron, which was, in his opinion, the active principle in Mr. Dahlke's filter. He had observed this medium to be the one employed by nature, for he found it to exist in all stratifications where the water was pure. Even if the surface of the soil were ever so foul, where the water percolated through certain rocks, such as the Malvern hills, which contained magnetic oxide of iron in great abundance, it was purified. He had been largely engaged in connection with some of the water companies in the purification of water, and he had set himself to work in order to discover, if possible, the effect of this magnetic oxide of iron upon water when used artificially as a filtering medium. He was not there, however, to give a lecture upon his own mode of filtration, but simply to say that, however well Mr. Dahlke's filters might act with charcoal, clay and silica, yet their special power, he contended, was dependent upon a certain proportion of the magnetic oxide of iron, the presence of which, in Mr. Dahlke's filtering medium, he had tested by the magnet. The use of this material as a filtering medium he (Mr. Spencer) laid some claim to.

Mr. Atkins said that Mr. Dahlke had rather depreciated the powers of carbon when used alone as a filtering me-

dium. He (Mr. Atkins) had manufactured some 40,000 or 50,000 blocks of carbon for filtering purposes, and could state that it had a most powerful effect in deodorising and purifying water. He had directed his attention to this subject for the last 12 years, and had experimented upon charcoal in many different forms as a purifier of bad water, and he was glad to find that the Moulded Carbon Company had introduced balls of carbon for filtering purposes. Oxygen was a great decomposer of the pernicious matter found in water, and this agent was brought to bear in an admirable manner by means of the great porosity of the carbon. He thought the failure of their efforts hitherto had been owing to their not having exposed the carbon to the action of the atmosphere after the water had passed through it. He contended that a simple ball of carbon was capable of accomplishing all they required as a purifying medium. He did not say that it was so effective as other means might be in correcting certain chemical impurities of water, but he contended that simplicity should be the object in a filter, and he thought the properties of carbon as a purifier of water should be well weighed before it was condemned. It was perhaps the most useful and most practical material for those purposes to be found in nature; and when they obtained it pure, and applied it in a convenient form, he was convinced that they had a most valuable purifying agent. He was so convinced of its efficacy when properly applied, that, when the Moulded Carbon Company were in want of funds, he (Mr. Atkins) took the matter up and spent many thousands of pounds upon it. He called upon the meeting to give carbon a fair consideration before they condemned it as a filtering medium.

Dr. Waller Lewis could give no details as to the efficiency of the filter which Mr. Dahlke had described as compared with other filters, but he could say, from his personal experience in a very large public department, that the filter as supplied by Mr. Dahlke was very efficient in deodorising and decolourising water, as well as in the removal of a very considerable amount of organic and inorganic impurities with which they were so bountifully supplied by the water companies of the metropolis. Whether or not this filter was better than others he did not pretend to say, because he had had no great amount of experience with other descriptions of filters. He would make one remark upon the expression in the paper, that too pure water was distasteful and unfitted for drinking purposes. That view was new to him. He was afraid that Mr. Dahlke was assuming a position he could not maintain. Unfortunately, in London and many other large towns in this country and on the continent, they were no judges of what pure water was, for they never got it. Their palates were so disorganised by being supplied with water that was not pure, but charged with salts of lime and other impurities, and the nerves of taste were in such a condition, that when they tasted really pure water they could not appreciate it. He had tasted some of the purest water that was to be found anywhere, viz., that of the Lake of Bala, in North Wales, which flowed through a bed of primitive rock. That water contained 1½ grain of inorganic matter per gallon, and persons who had been accustomed to the water of London considered the water to which he referred unfit for drinking, and did not at first like it at all. It was certainly new to him to hear that perfectly pure water was unfit for drinking.

Mr. Painter regretted that Mr. Dahlke had not dwelt more upon the admixture of silica with carbon. If the removal of organic impurities from water depended upon the power of absorption of the filtering medium, he thought silica possessed very little absorbing power. He thought the filtering medium should be as dense as it could be, consistent with a proper amount of porosity. The finer the filtering medium was, the more attenuated must be the stream of water that passed through it; and if surface filtration had anything to do with it, the larger the surface was, the greater the effect. According to the doctrine of Professor Stenhouse, the finer the porosity was, the better was the quality of the water, and quality ought to be studied before quantity; besides, quantity could always be regulated by the amount of filtering surface that was supplied. With a carbon ball of six inches diameter, he could filter water at a rate sufficient for most practical purposes, and by increasing the size of the ball, the quantity could be proportionately increased. Such a filter did not require to be cleaned oftener than two or three times a year, with such water as was supplied by the New River Company; and even if it required to be cleansed half-a-dozen times in a year this would be no bar to its use. Balls were more easily cleansed than plates by blowing air through them, by means of which the accumulated impurities were easily removed. He thought that method of expelling the dirt was better than producing reversed currents of water on Mr. Dahlke's plan, as in the latter case they must use the impure water which the filter was intended to remedy. A small carbon ball of three inches diameter would filter from three to four gallons per day. The impurities did not penetrate more than one-sixteenth of an inch into the ball, and it could be easily cleansed. If that were the result upon a small scale, he considered that the objection that they could not purify a large quantity of water with a carbon medium did not hold good. The Moulded Carbon Company deserved the highest credit for the form in which they had introduced carbon for filtering purposes. The adaptation of carbon as a filtering medium, he believed, emanated from Germany, and in a short time the poor man would be able to procure, for two shillings, a filter which would purify four gallons of water per day. He was rather surprised to hear the recommendation given to put the denser portion of the filtering material upon the outer portion of the plate, and he was at present at a loss to understand the benefit that was gained by so doing. Some objection had been taken to the alleged glazing of the carbon ball as prepared by the Moulded Carbon Company, but he might state that the glazing extended no farther than the surface, and the ball, upon being broken, would be found to be perfectly unglazed throughout the whole of its interior. The glazing on the outside was caused by the mould in which the ball was prepared, and the porosity was not in any way diminished. The ball was composed entirely of pure charcoal, without any admixture of silica. The base of the material was entirely carbonaceous; and if carbon were regarded as the proper medium for filtering purposes, he would say the moulded carbon filter combined the qualities of being easily cleansed, easily fixed, and of taking up very little room, which, he thought, were all the qualifications that could be desired in a filter.

Mr. Danchell begged to state, in reference to the statement that the use of carbon blocks was a German invention, that as early as the year 1847 he had manufactured filters with carbon blocks as a filtering medium, but having had time enough maturely to consider the subject, he found these did not answer, and therefore he abandoned the use of them. He now used pure animal charcoal, in a granulated state, without other admixture of any kind.

Mr. Wentworth L. Scott would mention that he had been called upon to make various experiments to test the comparative merits of vegetable and animal charcoal as a filtering medium, and they resulted, as regarded the absorption of organic matter, in favour of animal charcoal. With respect to the Moulded Carbon Company's balls, the defect appeared to be that the central hollow, or aperture, was in many cases on one side, and this, in a small ball, would evidently modify the action of the filter. With water containing a more than ordinary amount of organic matter, he found that animal charcoal exercised the most powerful purifying effect.

Mr. Morgan remarked that, after all, experience was the best test. He thought they might very well leave the relative merits of the various descriptions of filters to be decided by the public. The first speaker had impugned the originality of Mr. Dahlke's invention, and had alluded to a supposed infringement of his own patent;

but he (Mr. Morgan) had not understood Mr. Dahlke as setting up his plan in preference to all others. With respect to the supposed infringement of Mr. Spencer's plan of using magnetic oxide of iron, he had no doubt that Mr. Dahlke would be able to give such an explanation as would set Mr. Spencer's mind at rest upon that subject.

Mr. Dahlke, in replying upon the discussion, said with regard to Mr. Spencer having found magnetic oxide of iron in the filtering medium he employed, if that were the case he could assure Mr. Spencer that it was no infringement of his patent, because the presence of iron in his medium was solely due to the fact that the preparation of Torbane-hill mineral sometimes contained iron. After distillation, there was a residuum of ash which very much resembled animal charcoal in appearance, and sometimes a portion of oxide of iron was found amongst it. If, therefore, Mr. Spencer had found that substance in his filtering medium, it was solely due to that circumstance; for it was no part of his plan to use a distinct preparation of iron. He was not aware that there was any passage in his paper in which he had disputed the properties of magnetic oxide of iron; in fact, he was not aware that he had alluded to it at all, whilst he had fairly stated his opinion with regard to the moulded carbon. He would call their attention to one remark that had fallen from Mr. Painter. He understood that gentleman to state that a filter capable of purifying a very large quantity of water per day did not require cleansing oftener than five or six times in a year. If that were so, he should be glad to know where the impurities went to? They must go somewhere. If the filter acted properly, it must collect the impurities from the water, and the best filter was that which retained the impurities in a manner which admitted of their being easily removed; and if a filter required cleansing only to the extent stated by Mr. Painter, he (Mr. Dahlke) was inclined to doubt the efficiency of such an apparatus in collecting the impurities of the water.

Mr. Spencer begged to be allowed to disclaim any intention of discourtesy towards Mr. Dahlke.

The Chairman, in proposing a vote of thanks to Mr. Dahlke for his paper, said they were at all times much indebted to gentlemen who had devoted their attention to such an important matter as this in a sanitary point of view, for giving them the results of many years study of the subject. They were not a court to decide between the legal claims of rival inventors, but their thanks were due to any one who came forward to furnish them with information that might be of public advantage. He confessed he was unable himself to throw any light upon this subject. He had not studied it sufficiently, but he had been much pleased with the paper they had heard. As far as he could judge, it appeared to be an excellent method of filtration. There might be others equally good, for anything he knew, but upon that the meeting gave no opinion. He had now simply to propose that the thanks of the meeting be given to Mr. Dahlke for his paper.

The vote of thanks having been passed,

The Secretary announced that on Wednesday evening next a Paper, by Mr. P. L. Simmonds, "On the Trade and Commerce of the Eastern Archipelago," would be read. On this evening, J. Crawfurd, Esq., F.R.S., late Governor of Singapore, will preside.

Home Correspondence.

COLORING STATUES AND THE ARRANGEMENT OF WORKS OF ART.

The following letter has been addressed by the Very Rev. the Dean of St. Paul's, to Mr. Bell:—

My Dear Sir,—I regret much that I cannot attend at the Society of Arts, on the occasion of your lecture, but an engagement at dinner renders that impossible.

I have read with much interest your paper, in its present uncorrected form, and shall be glad to see it without its misprints. There is much truth, I suspect, in your distinction of the statue and the idol; you might add that *costliness* of material was everything in the latter, as showing the devotion of the worshipper.

I have entered into the subject in "The History of Latin Christianity" under Iconoclasm, in another form. The pictures and statues chiefly *worshipped* were in general wretched as art.

Believe me, my dear sir,
Ever faithfully yours,
H. H. MILMAN.

Deanery, St. Paul's, April 23, 1861.

Sir,—I shall be obliged by your allowing me to correct, in the next number of the *Journal*, three important errors in the report of my remarks on Mr. Bell's paper, on Wednesday evening last. The first is, where I am said to speak of "Milo," as the master of Phidias. We know of no sculptor of that name. It should be "Myron," the supposed author of the original (in bronze) of the statue of the Discobolus, in the British Museum. The other mistakes are, where I am said to refer to "Nicias, as the brother-in-law and (decorating) assistant of Phidias." I stated that the artist who assisted Phidias, in the great works alluded to, was Panœus or Panœnus. Nicias lived later, and is correctly associated with Praxiteles, in the story told of that sculptor, in a subsequent passage.

I will add, that I seem also to have been misunderstood by one of the gentlemen who addressed the meeting in the intention of my remarks on the colors of the walls and the heavy character of the ceilings of the sculpture-galleries of the British Museum. My observations were not directed against the decoration, *per se*, which exhibits, in many respects, both good taste and judgment, but in its relation to, and its effect upon the objects exhibited in the rooms. Apologising for troubling you with this note, I am, &c.,

RICHARD WESTMACOTT.

1, Kensington-gate, W., April 29, 1861.

Sir,—As an attentive listener to the very practical and instructive discourse of Mr. John Bell and the discussion which followed, I was much pleased with the sound views advanced. In the union of painting and sculpture, however, I hardly think objection enough was taken to the damaging effect of newly wrought marble upon oil pictures, especially when placed in connexion with the latter, the detriment to paintings being so great as almost to cause the prohibition of sculptures in the same gallery, which, apart from their brilliant whiteness, have the advantage of a tangible reality detrimental to a purely imitative art, an objection that ceases to exist in the case of architectural decoration and fresco paintings, which, though often of the highest class of art, have less of pictorial than mural character, being rather aids to architecture than existing independently of it. As an artist, I do not hesitate to say that the most gaudily painted image would be preferable next an oil picture to the finest work of Art in marble or plaster, *if left white*, a rule that holds good with antique marbles, though in a lesser degree, their fragmentary character and low tone of color rendering them less impertinent and obtrusive. In these remarks I do not discuss the aid or degradation sculpture may suffer from color; I merely state that if sculptures be brought into connexion with an imitative art upon a flat surface, that imitative art will be benefited by the sculptures partaking somewhat of its character, as may be instanced in the case of those grandly painted figures around the altar pieces of continental cathedrals, which are so beautifully blended with the pictures that you can hardly discern where the frame (or fore-ground) ends, and the imitative art begins. I do not say that two noble arts may not be and are

not degraded, and that they ought not to exist save apart. Here at least the unity is complete. If painting cannot be sculpture, sculpture may be painted, or at least stained, as old Time takes care it shall be. Cannot sculptors tone down their works before introducing them in connexion with paintings in oil? At the Paris Exhibition of 1855, the pictures suffered from being near sculpture, though from the width of the gallery, and their being placed at the intersections, or crossings, in a very slight degree. This, perhaps, in a miscellaneous gallery, was the most successful union ever effected. The *tout ensemble* was decidedly improved, and the fortunate sculptor done justice to, but slightly to the detriment of pictorial art.

I am, &c., JOHN LEIGHTON.

MECHANICS' INSTITUTIONS.

SIR,—It has long been a reproach against the numerous Institutions which have now been established in almost every town and village throughout the kingdom, that they are only Mechanics' Institutes by name; that for the purpose for which they were originally designed, of educating our artisans in the principles of science, they have altogether failed, and that, so far from being schools for adult instruction they have degenerated into news-rooms, lecture halls, and places for intellectual recreation. This may be true to a certain extent, but the charge will by no means apply to a large number of the Institutes within the Yorkshire Union. Much, however, may be said in extenuation of the charge when the low state of education which existed a few years since is considered, the little desire there was for mental cultivation, and the necessity for that preparation which has now in some measure been effected.

The first important step in the right direction was the establishment of the Society of Arts Examinations, which, by giving an appreciable value to certain branches of knowledge, afforded a practical stimulus to application; and as every year gives additional experience of the value of the certificates awarded, their influence is becoming more widely extended. From the smaller Institutes candidates are becoming more numerous, and each success is stimulating new aspirants to distinction, and doing more real good to self-improvement than appears by mere statistical results.

There was wanted, however, something more; there was needed the link which should connect the youth who had but an imperfect acquaintance with the rudiments of learning—owing to the demands of labour shortening his school days—with the more advanced scholar who might enter the lists with a reasonable prospect of success. To the youth of twelve, or perhaps younger, whose days were devoted to toil, the limit of sixteen fixed by the Society of Arts, and the attainments required, rendered the certificate which might prove so great a boon, a prize too far beyond his reach even to strive for, and, therefore, to the youth of the working classes it afforded no stimulus and exercised no influence. The missing link will, however, be supplied by the Elementary Examinations under the auspices of the Central Committee of Educational Unions in connection with the Society of Arts. The impetus which the acknowledgment of merit gives to industrial exertion, will commence with the lowest step, and we shall doubtless witness the good effects in a large addition to the number of candidates for the certificates of the Society of Arts.

Another important advantage will be gained by the formation of classes for instruction in elementary science by teachers who hold the certificate of the Department of Science and Art at South Kensington. Not only is the teacher stimulated to exertion by his reward depending on the success of his teaching as shown by the attainments of his pupils, but the latter are encouraged by the award of prizes, which it is hoped will have the effect, when the system is more generally known, of promoting that education of artisans in the principles of science which may be considered the primary and ostensible object of Mechanics' Institutes.

But no scheme, however judiciously devised, will prove successful unless its benefits and the modes of obtaining them are brought prominently and continuously before the people for whom they are intended. Advertising and publicity are as necessary to educational movements as to quack nostrums, and I would suggest that the committee of every Institute should by circulars, bills, and occasional public meetings, make the several advantages to which I have alluded as widely known as possible. The benefits to be gained, and the mode by which they may be gained, should be kept constantly before the public of each locality; every Institute should be an office in which information on all matters of detail may be obtained, and without being discouraged by apparent obstacles the idea should be steadily kept in view, that success in a good cause is the sure reward of perseverance.

I have heard it suggested that the Central Committee of Educational Unions for Elementary Examinations should include the representatives of local boards. There might be some advantage in this, but experience has abundantly shown that a numerous committee is impracticable for any useful purpose. In the multitude of counsellors there may be safety, but far more business is done by a few.

I am, &c., BARNETT BLAKE.

Leeds, April, 1861.

Proceedings of Institutions.

FARNHAM YOUNG MEN'S ASSOCIATION.—The second triennial report of this association states that it is rapidly advancing in the accomplishment of those ends for which it was established, viz., "mutual improvement, moral and religious, as well as intellectual;" these objects being attained by friendly intercourse amongst a carefully selected body of members, the establishment of a library and reading room, the formation of various sections, and the delivery of first-class lectures once a fortnight during the winter session. The Association now numbers 27 honorary members, 110 ordinary members, and 78 lady members. The committee confidently appeal to this report, and think they may take great encouragement for the future from its general tenour, at the same they would remind each individual member of the association that no satisfactorily permanent results can follow the efforts of an elected committee for the good of the society at large, unless each member shall use his best endeavour to maintain and advance its good name, and to promote its well-being by every means in his power. In their last report, the committee stated that "since the first formation of the association a library of 481 volumes had been collected, 96 of which had been purchased during the year 1856;" they now announce that the library contains no less a number than 938 volumes, showing an increase by purchase of 457 volumes since September 1st, 1856. The money expended on the library during the three years ending September 1st, 1859, has amounted to £146 1s. 11d., or an annual average of £48 13s. 11¾d.; the items of which are,—for books £111 12s. 7d.; for periodicals £21 5s. 6d., many of which are now bound; for binding £7 8s. 8d.; and for incidentals £5 15s. 2d. The committee have constantly regretted that the state of the funds did not permit of a library catalogue being published more frequently than has yet been done; still it will be absolutely necessary that another "supplement" should be printed shortly. The issue of books to the members for home-reading has been attended with very pleasing results; between October 1st, 1856, and October 1st, 1857, 1556 volumes were put in circulation, besides a large number of monthly parts of serials; between October 1st, 1857, and October 1st, 1858, 2434 volumes were issued, showing an increase on the previous year of 878 volumes. This would give an average of about 11 volumes to each member, supposing every member on the list to have availed himself of the library. There were

also issued in that year 443 monthly parts of serials, or nearly 37 per month. The committee feel sure that when the returns are made up for 1858-9, a still further increase will be manifest; these returns are a very strong evidence of the manner in which the library is appreciated by the members generally. The attractions of the reading room have also been much increased since September, 1856; a large number of papers and periodicals being furnished for the use of the subscribers. Since the publication of the first triennial report three new sections of the association have been formed, viz:—A chess section, the meetings of which are held in the reading room, of which Mr. T. R. Patterson is the Secretary. A philharmonic section, (of which there is an elementary branch conducted by Mr. Wonnacott on Thursday evenings) which holds its meetings in the lecture room on every Monday evening; Conductor, Mr. Nuske; Secretary, Mr. J. J. Bevan. This section has given several open nights, to which the members of the association, and friends of the performers were admitted free. An elocution section, which holds its meetings in the lecture room on every Tuesday evening; Secretary, Mr. F. J. Turner. The last Tuesday in every month is an open night, to which members of the association are admitted free; a further privilege of introducing two friends being granted to the members of the section. The following lectures have been delivered during the sessions which have occurred since the last report was published:—"The Food of Man," Rev. M. Harrison; "Entomology," Rev. W. H. Hawker; "On Norway," Rev. T. Bacon; "Discoveries in Light," Rev. Canon Carus; "The Planets—and whether they be all Inhabited," Rev. Mark Cooper; "The Microscope," Rev. H. R. Rynd; "Incidents of Spanish Travel," Rev. T. J. Maynard; "The Earth—Past, Present and Future," Rev. G. R. Sumner; "The Life of the late Dr. Kitto," Rev. J. W. S. Powell; "On Russia," Rev. Canon Champneys; "Incidents of a Tour in the Crimea," Rev. Haldane Stewart; "Chaucer and his Times," the very Rev. Dean Trench; "On the Application of Science to Human Health and Well being," E.W. Lane, Esq., M.D.; "The Electric Telegraph," C. F. Varley, Esq.; "On Mineralogy," Rev. H. C. Eade; "A Day at Rome in 1857," Rev. A. R. C. Dallas; "A Night at the Cambridge Observatory," Rev. Canon Carus; "Cavern Researches," E. Vivian, Esq.; "Ballad Literature," Rev. W. L. Blackley; "India—Past and Present," Rev. T. G. Clarke; "The Manners and Customs of the Greeks," Rev. J. E. Sabin; "George Stephenson, Miner and Engineer," Rev. T. G. Hatchard; "Characteristics—English, Scotch, and Irish," Rev. F. Trench; "Mahomet and his Religion, &c.," Rev. Canon Champneys; "Cowper and his Poems," Rev. J. W. S. Powell; "On China," Rev. Canon Champneys; "A Ship at Sea," Rev. Haldane Stewart; "Manners and Customs of the Chinese," Rev. T. G. H. Hough; "Insect Life," Rev. T. C. Clarke; "Ireland in 1858," Rev. A. R. C. Dallas; "Advertisements," Rev. W. L. Blackley; "Recollections of a Tour in Switzerland," Rev. E. D. Wickham; "Farnham and its Borough," Rev. R. N. Milford; "The Ocean," Rev. Mark Cooper; "On Australia. Rev. J. Bacon; "The Days of the Week," Rev. Charles Kingsley; "The Romance of Chemistry," W. White, Esq.; "The Turks and their Customs," Rev. J. E. Sabin. All these lectures were delivered gratuitously, and in four instances only the lecturers' travelling expenses were paid. The lecture on "Farnham and its Borough" has been published, at the request of the committee. The number of lectures in each session is, as a rule, limited to twelve. The receipts and expenditure of the last three sessions have been as follows:—Fourth session, receipts £23 6s., expenditure £11 3s.; Fifth session, receipts £16 12s., expenditure £8 2s. 8d.; Sixth session, receipts £22 9s. 6d., expenditure £14 9s. The actual receipts at lectures are diminishing, in consequence of the rapid increase of the number of members and subscribers to the association, who are admitted free to the lectures. The plan of issuing lecture tickets for the labouring classes and domestic servants, for back seats at half price, has been attended with the happiest results, no less a number than 423 having availed themselves of this privilege in the three lecture sessions during which the scheme has been adopted. The six best scholars in each National School are admitted free. The chair has usually been taken at the delivery of the lectures by the President, and the attendance of members and friends has always been very large, the room on several occasions being much overcrowded. The committee hope ere long to be enabled to take some effectual steps to improve the ventilation of the lecture room. The committee have much pleasure in again announcing that the state of the funds is very encouraging, when taken in connection with the fact that the annual receipts show a steady advance in the number of ordinary members. The annual accounts for the last three years stand as follows;—1856, receipts £80 15s. 1d., expenditure £86 5s.; 1857, receipts £97 17s. 8d., expenditure £96 6s. 3d.; 1858, £89 18s. 10d., expenditure £92 3s. 3d. The receipts for 1859 already amount to £18 16s. 6d. In closing this report the committee, on behalf of themselves and the members of the association generally, offer their warmest thanks to their esteemed President, the Lord Bishop of Winchester, for his unfailing interest in the welfare of the association, to which they cannot but attribute a very large share of the success which has hitherto attended its operation; and for his kindness in taking the chair at so many of the lectures; and to the Vice-President, the Rev. J. S. Utterton, for his constant exertions on behalf of the association. They also beg to offer their best thanks to those numerous friends who have so kindly come, in many cases from a long distance, to deliver lectures before the members; and to the Treasurer, Secretary, and all the elected officers, for their unwearying assiduity in the discharge of their various duties. Since the publication of this report, which is dated September 1859, the association appears to have made considerable advances, as shown by the balance sheet for 1860.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Royal Inst., 2. General Monthly Meeting.
Entomological, 8.
Brit. Architects, 8. Anniversary.
United Service Inst., 8½. Major Rhodes, "Submarine Telegraphy within the limits of the Arctic and North Atlantic Regions."

Tues. ...Royal Inst., 3. Mr. John Hullah, "On the History of Modern Music."
Civil Engineers, 8. Continued Discussion upon "The National Defences."
Pathological, 8.
Photographic, 8.

Wed. ...Literary Fund, 3.
Society of Arts, 8. Mr. P. L. Simmonds, "On the Trade and Commerce of the Eastern Archipelago."
Geological, 8 (Burlington House). 1. M. Alfred Fontan, "Description of Two Bone-Caves in the Mountain of Ker, at Massat, Department of the Ariege." 2. Mr. Joseph Prestwich, "Notes on some Further Discoveries of Flint Implements in the Drift; with some suggestions for further search."
Graphic, 8.
Microscopical, 8.
Royal Soc. Literature, 8.
Archæological Assoc., 8½.

Thurs...Royal Inst., 3. Mr. Pengelly, "On the Devonian Age of the World."
Philological, 8.
Artists and Amateurs, 8.
Antiquaries, 8½.

Fri. ......United Service Inst., 3. Colonel Shafto Adair, "England, her Wars and Expeditions since 1815."
Astronomical, 8.
Royal Inst., 8. Mr. W. S. Savory, "On the Relation of the Animal and Vegetable to the Inorganic Kingdom."

Sat. ......Asiatic, 3. Anniversary.
Royal Inst., 3. Prof. Max Muller, "On the Science of Language."
Royal Botanic, 3¾.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Num.

Delivered on 19th April, 1861.

60. Local Acts (61. North Somerset Railway; 62. Bambridge Extension Railway; 63. Sittingbourne and Sheerness Railway; 64. Rhyl Harbour, Bridge, and Railway)—Admiralty Reports.
162. Brewers, &c.—Accounts.
171. New South Wales (Military Expenditure)—Return.
172. Railway and Canal Bills—Fourth Report from Committee.
131 (1). Civil Service Estimates—Class 1.
102. Bills—Industrial Schools—(Amended).
104. ,, Copyright (Works of Art).
105. ,, Borough of Dublin—(Amended by the Select Committee).
108. ,, Queensland Government.
Lights, Buoys, and Beacons—Report of Commissioners, Vols. 1 and 2.

Delivered on 20th and 22nd April, 1861.

72 (1). East India (Indigo Commission)—Papers, Part 2.
74. Joint Stock Companies—Return.
103. Public Offices—Return.
130. Revenue Departments—Estimates.
136. War Office (Temporary Clerks)—Return (a corrected Copy).
161. Chelsea, Kensington, and Birkenhead)—Returns.
170. Apprentices (Merchant Service)—Return.

Delivered on 23rd April, 1861.

143. Savings Banks (Number of Depositors, &c.)—Accounts.
143 (1). Savings Banks (Sums Paid or Withdrawn, &c.)—Return.
158. Battersea Burial Ground—Return.
159. War Office (Account Branch)—Return.
72 (2). East India (Indigo Commission).
107. Bills—Railway Companies' Mortgage Transfer (Scotland).
109. ,, Reformatory Schools (Scotland).
111. ,, Courts of Justice Building.

Delivered on 24th April, 1861.

3 (1). Corporal Punishment—Supplemental Return.
72 (3). East India (Indigo Commission)—Supplemental Papers.
165. Reformatory Schools (Dublin)—Return.
179. Alderney Harbour—Return.
183. Military Prisons—Return.
173. Business of the House—Report from the Committee.

Delivered on 25th April, 1861.

178. Metropolitan Board of Works—Return.
182. Enfield Factory—Return.
185. Ionian Islands—Papers and Correspondence.
188. Committee of Selection—Sixth Report.
112. Bill—Dwellings for Working Classes.
Italy—Further Correspondence. Part 9.

Delivered on 26th April, 1861.

163. National Debt—Return.
181. Woods, Forests, and Land Revenues—Abstract Accounts.
189. Railway and Canal Bills—Fifth Report from Committee.
192. Treasury Chest—Account.
196. Revenue (1860)—Particulars of Memorials.
113. Bills—Combination of Parishes Dissolution (Scotland).
114. Bills—Law of Foreign Countries—Lords' Amendments.

Delivered on 27th and 29th April, 1861.

60. Local Acts (65. Llanelly Railway and Dock Company (New Lines, &c.)—66. Wexford Harbour Commissioners—67. New Ross Port and Harbour—68. Aberystwith and Welsh Coast Railways)—Admiralty Reports.
120. Increase and Diminution (Public Offices)—Abstract of Accounts.
184. Cork Union Workhouse—Abstract Return.
190. Electors, &c. (West Riding of Yorkshire)—Return.
193. Foreign Wine—Abstract.
195. Chamber of London—Annual Accounts.
38 (3). Trade and Navigation Accounts (31st March, 1861).
132. Post Office Packet Service—Estimate.
194. Thames Conservancy—Paper.
176. Cambridge University—Papers.
177. Oxford University—Papers.
115. Bills—Offence against the Person (Amended by the Select Committee).
116. ,, Edinburgh Assessments.

SESSION 1860.

570. Sessional Printed Papers—Numerical List and Index.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, April 26th*, 1861.]

Dated 17th December, 1860.

3091. A. S. Stocker, Wolverhampton—Imp. in the manufacture of tyre for wheels.

Dated 6th February, 1861.

306. T. Gee, Nottingham—The production of a new composition or compositions, of which refuse leather is the chief ingredient, and manufacturing therefrom articles of utility, plain or ornamented.

Dated 14th March, 1861.

640. A. F. Ménard, 10, Rue de Strasbourg, Paris—Imp. in tanning and the apparatus employed therein. (A com.)

Dated 15th March, 1861.

658. H. A. Ward, Birmingham—Imp. in apparatus for transmitting signals on railway trains.

Dated 25th March, 1861.

748. J. Morgan and A. T. Jay, 132, Upper Thames-street, E. Edwards, 13, Beaufort-buildings, Strand, and J. Tilston, 2, Lower Gore, Kensington—Imp. in ropes or cables for submarine or other electric telegraphs, and for the rigging of ships and other purposes.

Dated 1st April, 1861.

798. G. Edmondson, Queenwood, Southampton—Imp. in washing machines.

Dated 2nd April, 1861.

813. A. Huray and H. Leilé, 42, Laffitte-street, Paris—A new optical apparatus for reproducing and varying all sorts of drawings, which apparatus they call goniometroscope.

Dated 4th April, 1861.

828. J. W. Lee, Crich, Derbyshire—Imp. in apparatus used in winding up watches, clocks, timepieces, musical boxes, or telltales, or for other purposes to which the same may be applicable.

Dated 5th April, 1861.

838. W. Richardson, 24, New Walk, Leicester—Imp. in carriage and other axles, and also in shafts and other parts of machinery exposed to the action of the atmosphere.
844. G. Hawksley, Three Mill-lane, Bromley-by-Bow, Middlesex—Imp. in apparatus for measuring water and other liquids.

Dated 8th April, 1861.

860. J. Walker and J. Barnes, Oakenshaw, Lancashire—An imp. in the manufacture of "card cloth," used for carding cotton, wool, and other fibrous substances.
862. H. W. Blake, Soho, Birmingham—Imp. in coining machinery and in apparatus employed for regulating the expansion of elastic fluids.

Dated 10th April, 1861.

879. J. Ivers and J. Pollitt, Preston—A certain imp. in machinery or apparatus employed in preparing cotton, wool, flax, and other fibrous substances for spinning.
881. W. B. Peck, Broad-street, Bristol—Imp. in screw propellers.
883. G. Gardiner, New York City, U.S.—A new improved spring.
885. A. R. Rogers, Gray's-inn-road—Imp. in dowels.

Dated 11th April, 1861.

887. D. Chalmers, Glasgow—Imp. in weaving textile fabrics.
888. W. McConnel, Manchester—Imp. in engines for carding cotton and other fibrous materials.
889. J. Shand and S. Mason, 245, Blackfriars-road—Imp. in steam fire engines and pumps.
890. W. Bury, Portman-street, Marylebone—Imp. in steam engines, and in boilers for the same.
891. J. Lancelott, 2, Brownlow-road, Dalston—Imp. in machinery for the manufacture of sheet metal chains.
893. C. Stevens, 31, Charing-cross—An improved apparatus for raising liquids, especially beer and wine from casks. (A com.)
895. R. A. Brooman, 166, Fleet-street—Imp. in sizing or preparing paper and textile fabrics in order to render them waterproof, and to increase the strength thereof. (A com.)
896. R. Smith, Shaw-house, Melksham, Wiltshire—Imp. in roller blind apparatus.
897. W. E. Newton, 66, Chancery-lane—Imp. in pressure gauges. (A com.)
898. S. Roberts, Hull—Imp. in steam-engines, and in generators to be used therewith.
899. J. M. Dunlop, Manchester—Imp. in machinery for cleansing cotton.

Dated 12th April, 1861.

901. G. C. Hasler, 19, Vittoria-street, Birmingham—Imp. in the joints or hinges of lockets.
902. T. Carr, Chowbent, Lancashire—Imp. in machinery or apparatus for forging and shaping articles of iron or other metal or material.
903. J. Ward, Blackburn, and R. Greenwood, Whittle-le-Woods, Lancashire—Imp. in machinery or apparatus for preparing fibrous materials to be spun.

Dated 13th April, 1861.

905. J. E. A. Gwynne, Essex-street Wharves, Strand—Imp. in machines for breaking, crushing, and reducing stones and other substances.
907. T. Bailey, Aston-road, Birmingham—Imp. in breech-loading fire-arms.
908. J. R. Cooper, Birmingham—An imp. in, or addition to, certain kinds of breech loading fire-arms and ordnance.
909. J. Silvester, West Bromwich, Staffordshire—Imp. in spring balances or weighing machines, and in dynamometers.
911. G. Graham, Dumbarton, N.B.—Imp. relating to ornamental cotton fabrics having Turkey-red grounds.
913. E. Corke, South Borough, Tonbridge Wells, Kent—An improved instrument to be fixed on the bayonet or muzzle of a rifle for estimating distances.
914. C. Roberts, Douglas, Isle of Man—Imp. in boots and shoes, and other similar coverings for the feet.
915. C. D. Abel, 20, Southampton-buildings, Chancery-lane—Imp. in the construction of turntables. (A com.)
916. W. T. Eley, Gray's-inn-road—Imp. in the manufacture of cartridge cases for breech-loading fire-arms.
917. C. D. Abel, 20, Southampton-buildings, Chancery-lane—Imp. in machinery for forging nails. (A com.)

Dated 15th April, 1861.

919. A. Bradbury, Oldham, Lancashire—Imp. in machinery for spinning and doubling cotton, and other fibrous materials.
921. E. Brooks, Birmingham—New or improved machinery for grinding and polishing swords, matchetts, and knives, which said machinery may also be employed for grinding gun barrels and files, and for other like purposes.
923. A. Sax, Paris—Imp. in ordance and projectiles.
924. T. Miller, Fossaway, Perth, N.B.—Imp. in the method of, and machinery for, preparing india-rubber and other similar gums for insulating telegraphic wires, and in machinery for laying or applying strips of india-rubber and other similar gums, or strips of fibrous or textile material on to telegraphic wires.
925. R. C. Furley, Edinburgh—Rendering pills tasteless by means of a coating of albumen.
926. F. Lennard, Belgrave-gate, Leicester—Imp in the manufacture of looped pile fabrics.
927. F. Gye, Wandsworth-road, Surrey—Imp. in obtaining light, and in the apparatus employed therein.

Dated 16th April, 1861.

928. S. Ridge, Hoviley-bridge, near Hyde—Imp. in apparatus applicable to steam boilers and steam engines.
929. F. M. Eden, 5, Hare-court, Temple—An improved method of manufacturing silicate of lime or hydraulic cement.
930. F. M. Eden, 5, Hare-court, Temple—An improved cartridge for breech-loading guns.
931. P. Gipouloux, 29, Rue Thevenot, Paris—An improved cooking stove.
932. J. D. Malcolm, Brixton, Surrey—Imp. in the manufacture of nitric acid and caustic soda, which are also applicable to the obtaining of other chemical products.
933. R. Ransome, Ipswich—Imp. in inkstands.
934. C. Fletcher, Nottingham—Improved machinery or apparatus for the manufacture of chenile.
935. R. Hodgson and Enoch Holden, Carlisle—Imp. in the manufacture of soap.
936. D. Chalmers, Glasgow—Imp. in looms for weaving.

Dated 17th April, 1861.

937. W. Jenkins, Montpelier-street, Brompton—Imp. in medicated belts or bands for the alleviation of pain in or prevention of cholera, and for the prevention or cure of pulmonary or other complaints.
941. J. Vickermann, Taylor-hill, near Huddersfield—Imp. in syphons, for carrying off the condensed water from steam-pipes.
942. G. Leroy, Bristol—Improved construction of vessel for containing aerated liquids.
945. W. Clark, 53, Chancery-lane—Improved arrangement of atmospheric post for the transmission of letters, papers and other despatches, and articles in tubes. (A com.)

INVENTION WITH COMPLETE SPECIFICATION FILED.

971. J. P. Schenkl, Boston, U.S.—A new and useful packing for projectiles for guns or ordnance, especially those which are rifled or grooved on their bores.—19th April, 1861.

PATENTS SEALED.

[*From Gazette, April 26th*, 1861.]

April 26th.
2640. T. Neal.
2642. E. Harrison, W. Bradbury, J. Buckley, & D. Garside.
2646. A. S. Stocker.
2652. J. Beck.
2657. J. M. Henderson.
2660. W. Bull.
2662. L. Martin and O. Penfold.
2666. J. Anderson.
2671. E. F. Prentiss.
2672. J. Underhill.
2681. H. Williamson.
2688. W. T. Denham.
2694. J. Armour.
2703. J. Mitchell.
2711. J. Webster.
2731. T. Cobley.
2734. P. W. Rennel.
2763. W. Spence.
2788. R. W. Waithman and J. Waithman.
2798. J. Schofield & M. Schofield.
2812. J. C. M. Béziat.
2858. S. A. Varley and C. F. Varley.
156. W. Chark.
184. J. Deakin and C. Cresswell.
410. A. V. Newton.

[*From Gazette, April 30th*, 1861.]

April 30th.
2673. W. Edwards.
2685. G. Hamilton.
2687. R. A. Brooman.
2693. W. Durham.
2697. G. Shillibeer and G. Giles.
2698. R. B. Pilliner.
2699. T. Wrigley.
2702. P. Spence.
2707. E. F. Prentiss.
2708. E. F. Prentiss.
2709. J. Lancaster.
2714. W. Green.
2716. J. Froggatt, jun.
2718. T. W. Rammell.
2724. C. Neumann.
2726. E. Howe, jun.
2732. E. Salisbury.
2741. S. Fox.
2786. W. Clark.
2792. J. S. Crosland.
2803. G. Bagshaw.
2818. R. Bodmer.
2829. B. Blackburn and H. Carr.
2862. R. Jobson.
2929. H. Gilbee.
3078. W. E. Newton.
196. W. Longmaid.
364. C. F. Atkinson.
560. R. Brearley, jun.
595. W. H. Buckland.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, April 26th*, 1861.]

April 22nd.
903. C. Lungley.

April 24th.
914. J. M. Fisher.

[*From Gazette, April 30th*, 1861.]

April 25th.
918. J. Braidwood.

April 26th.
936. W. Keiller.
978. L. Talabot.
987. W. Clark.
998. T. Preston.
999. W. S. Hollands.

April 27th.
925. E. Hunt and H. D. Pochin.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, April 26th*, 1861.]

April 23rd.
1104. J. Horsfall.

[*From Gazette, April 30th*, 1861.]

April 26th.
960. J. Barling.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietors' Name.	Addrress.
4350	March 30.	The Fluted Legging Spring	Thomas Davenport	185, Rockingham-street, Sheffield.
4351	,, 30.	The Mechian Travelling Bag	Mechi and Bazin	Regent-street, W.
4352	April 3.	A Capping Ring	Peter B. Cow	Cheapside, E.C.
4353	,, 5.	Improved Round Drift	John Eglin	Amrolee, near Surat, East India.
4354	,, 9.	Screw Wrench	John Palmer and Sons	Beech-lanes, near Birmingham.
4355	,, 11.	Draught Box and Draught Plate for Grates	Henry Crichley	Birmingham.
4356	,, 17.	Railway Hand Flag and Fog Signal Case	Cuthbert Harrison Thew	Whitehaven.
4357	,, 17.	The Elcho Neck Tie	Thomas Harris Toms	Staining lane, City, E.C.
4358	,, 17.	Cottage Washing Machine	John Gibson	Malton, Yorkshire.
4359	,, 18.	Holder or Binder for Music and other Paper	Edwin Orchard	Balsale-heath, near Birmingham.
4360	,, 19.	Thread Sample Book	Kerr and Clark	Linside Thread Works, Paisley, N.B.
4361	,, 24.	Landau Body	Cook and Holdway	12, Mount-street, Grosvenor-square, W.
4362	,, 26.	Combined Gun and Cartridge Case	George Gibson Bussey	Davis's-passage, New Oxford st. W.C.
4363	,, 26.	The Improved Atmospherical Hat	Wm. Gillett	Market-place, Hull.
4364	,, 29.	Anslow's Ready Threaded Needle and Cotton Box	Charlotte Sarah Anslow	68, Darlington-street, Wolverhampton.

Journal of the Society of Arts.

FRIDAY, MAY 10, 1861.

INTERNATIONAL EXHIBITION OF 1862.—GUARANTEE DEED.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £395,000, have already been attached to the Deed.

GUARANTEE FUND FOR THE EXHIBITION OF 1862.

The following additions have been made since the last announcement, in the *Journal* for May 3:—

NAME.	AMOUNT.	REPRESENTING THE OBJECTS OF THE SOCIETY—ARTS, MANUFACTURES, AND COMMERCE.
J. Passmore Edwards, 166, Fleet-street, E.C.	£100	Arts.
Henry Bennett, 166, Gresham House, E.C.	200	Commerce.
Charles Clifford, Temple, E.C.	200	Arts.

BY ORDER,

P. LE NEVE FOSTER, *Secretary.*

INTERNATIONAL EXHIBITION OF 1862.

Her Majesty's Commissioners for the Exhibition of 1862 have received information that the following arrangements have been made in foreign countries to represent the interests of intending exhibitors :—

Portugal.—A commission has been formed, of which his Majesty the King, Dom Fernando II., is president, and Counsellor Joaquim Larcher, Director General of the Department of Commerce and Manufactures, is secretary.

Belgium.—A commission of 18 influential gentlemen has been formed, of which Le Sieur Dulieu, Chef de Bureau au Ministère de l'Intérieur, is the secretary.

Wurtemburg.—Doctor von Steinbeis, Director of the Central Board of Commerce and Industry, will represent this state.

In Baden—The Grand Ducal Department of Commerce (Handels Ministerium).

In Hesse Cassel—The Commission Electorate of Commerce and Industry at Cassel.

In Lubeck—The Town Office, Stadt Aust, will act as commissioners.

CONVERSAZIONI.

The first Conversazione of the present Session was held at the Society's House, on Saturday evening last, when the whole of the Rooms were thrown open. In the Great Room were hung the pictures by the late John Cross, of which a list was given in last week's *Journal.*

Arrangements were made by which Mr. Ladd was enabled to exhibit Bunsen and Kirschoff's Spectrum experiments. These experiments are of a peculiarly interesting and important character, and have already led to the discovery of a new metal. Messrs. Smith and Beck, Messrs. Powell and Lealand, and Mr. Baker, each exhibited Binocular Microscopes, constructed upon the principle recently perfected and given to the world by Mr. F. H. Wenham. The binocular arrangement of the microscope is probably the greatest optical improvement that has been made for many years past, as it does for the microscopic object what the stereoscope does for the photographic image, viz. :—enables it to be seen in its true form.

Mr. Charles Jones exhibited, in the Great Room, a Series of Transparent Photographs, which were projected on to a screen, 20 feet square, by means of the oxy-hydrogen light. The subjects shown comprised views in the Holy Land Italy, France, &c., and groups of statuary.

Mr. Thomas Battam, jun., exhibited several Etruscan Vases, being reproductions from originals at the British Museum and in other collections, illustrating the perfection to which fictile manufactures have now attained.

Mr. Richard A. Green contributed a Case of Jewellery principally of classical design.

Mr. Coryton exhibited Models of his Wave-Line system of constructing Vessels, of which an account will appear in a future number.

Mr. West contributed Specimens of his Fluid Compass, in which compensation for expansion and contraction in the fluid is provided for by the introduction of a corrugated diaphragm at the bottom of the box.

Some of Mr. Abel's Fuses, for firing mines and cannon, were exhibited by Mr. Ladd. These fuses require only a very weak electric current to ignite them.

Mr. Maillard exhibited his Chronometer Compass and Diagrams for determining the longitude.

Dr. Cattell exhibited specimens of purified gutta-percha and varnishes.

A Collection of Indian Paintings in Talc, remarkably highly finished, were contributed by Mr. Blair.

The Exhibition of Patented Inventions was arranged in the lower Room, and the various patentees attended to explain their models.

The thanks of the Council are due to those gentlemen who so kindly lent their specimens on this occasion.

The Second Conversazione of the present Session will be held on Saturday, the 1st June, at the South Kensington Museum. The card for this Conversazione will admit the Member and two ladies, or one gentleman.

LEGAL POSITION OF INSTITUTIONS.

The attention of the Council having been drawn to the fact that the present state of the law as regards Dramatic Copyright and Dramatic Representations is attended with inconvenience, in connection with elocution classes and entertainments at some of the Institutions in Union, a Committee has been formed to investigate the subject.

Any Institution that may have been threatened with legal proceedings, is requested to send a full statement of the facts of the case to the Secretary of the Society of Arts, for the information of the Committee.

THIRTEENTH ANNUAL EXHIBITION OF INVENTIONS.

The Exhibition was opened on Monday, the 1st of April, will remain open every day until further notice from 10 a.m. to 4 p.m., and is free to members and their friends. Members by ticket, or by written order, having their signature, may admit any number of persons. Members of Institutions in Union with the Society are admitted on showing their cards of membership.

TWENTY-FIRST ORDINARY MEETING.

WEDNESDAY, MAY 8, 1861.

The Twenty-first Ordinary Meeting of the One Hundred and Seventh Session was held on Wednesday, the 8th inst., John Crawfurd, Esq., F.R.S., late Governor of Singapore, in the chair.

The following gentlemen were proposed for election as members of the Society:—

Atkins, John P.	Halstead-place, Sevenoaks, Kent.
Barnett, George Henry	42, Wilton-crescent, S.W.
Boyes, John	8, Kensington-garden-terrace, W.
Brown, Edward	East-hill, Wandsworth, S.W.
Chomel, J. A.	4, St. James's-street, S.W.
Cohen, Barnet Solomon	9, Magdalen-row, Goodman's fields, E.
Douglas, Sir Charles, K.C.M.G., M.P.	27, Wilton-crescent, S.W.
Garnett, William J., M.P.	21, Grosvenor-place, S.W.
Goff, Joseph, Jun.	Little Cashiobury, Watford.
Goldsmid, Frederick, D.	50, Harley-street, W.
Gridley, Captain H. Gillett	49, Wilton-crescent, Belgrave-square, S.W.
Hamilton, Sir Robert N. C., Bart.	129, Park-street, Grosvenor-square, W.
Howard, Sir Ralph, Bart.	17, Belgrave-square, S.W.
Innes, John, Jun.	46, Porchester-terrace, W.
Jackson, Richard Medland	45, Piccadilly, W.
Knight, Valentine	3, Cornwall-terrace, Regent's-park, N.W.
Losada, J. R.	105, Regent-street, W.
Marjoribanks, Edward	34, Wimpole-street, W.
Meekins, T. Mossom, B.A.	32, Lincoln's-inn-fields, W.C.
Moreton, Hon. A. H. Macdonald	112, Gloucester-place, Portman-square, W.
Neal, John	16, St. James's-place, S.W.
Palliser, Captain Arthur	70, Inverness-terrace, Kensington-gardens, W.
Park, Lieut.-Colonel Archibald	41, Porchester-square, W.
Petrie, Samuel	46, Ebury-street, S.W.
Reid, Lestock Robert	122, Westbourne-terrace, Hyde-park, W.
Rennie, George Banks	39, Wilton-crescent, S.W.
Routledge, G. F.	21, Kensington-park-gardens, W.
Scott, J. S.	46, Kensington-park-gardens, W.
Sibthorp, Henry A. M. Waldo	57, Chester-square, S.W.
Sparkhall, Edward	142, Cheapside, E.C.
Tayler, James George	23, Norfolk-crescent, Hyde-park, W.

The following candidates were balloted for and duly elected members of the Society:—

Baker, John	16, Brunswick-sq., Brighton.
Beddoe, William	4, Honey-lane, Cheapside, E.C.

Campbell, R. J. R.	62, Moorgate-street, E.C.
Carter, William	Ebbw Vale Co., 7, Lawrence Pountney-hill, E.C.
Clarke, David Ross	31, New Broad-street, E.C.
Douglas, John D.	166, Fenchurch-street, E.C.
Edmondson, John B. ...	3, Broughton-terrace, Great Clowes-street, Manchester.
Fernie, Ebenezer Waugh	Highfield, Berkhampstead.
Fletcher, Joseph	Whitehaven.
Fox, Edwin	4, Cullum-street, E.C.
Hancock, Frederick Wm.	4, Adams-court, Old Broad-street, E.C.
Jewesbury, H. W..........	2, Mincing-lane, E.C.
Jones, William Charles Hussey	Leeswood Green Collieries, near Mold.
Montgomerie, Hugh Edmondstone	17, Gracechurch-street, E.C.
Palmer, Edward Howley	11, King's Arms-yard, E.C.
Pearce, William	Springfield, near Poole, Dorset.
Pellas, C. A.	42, St. Mary Axe, E.C.
Reed, Richard Kingsford	110, Grange-road, Bermondsey, S.E.
Richardson, F.	7, Mincing-lane, E.C.
Rimington, Alexander ...	Frognalls, Hampstead, N.W.
Socher, F. A. de	28, Clement's-lane, Lombard-street, E.C.
Sparks, William S.	28, Conduit-street, Hanover-square, W.
Thorne, Augustus	4, Cullum-street, E.C.
Thurburn, Robert	5, Crosby-square, E.C.
Tomlins, P. N.	Painters' Hall, Little Trinity-lane, Cannon-street, E.C.
Twentyman, Alfred G....	Tettenhall, near Wolverhampton.
Ward, John	5 & 6, Leicester-square, W.C.
Watson, J. Y.................	Effra-house, Brixton, S.

The Paper read was—

ON THE TRADE AND COMMERCE OF THE EASTERN ARCHIPELAGO.

By Peter Lund Simmonds.

Commerce and geographical research have made great strides in the last ten or twelve years, but we have much yet to learn and to carry out in both these fields of operation. Having spent millions in the prosecution of researches in the Arctic and Antarctic regions, fraught with little benefit to the world at large, our enterprising travellers and merchants are now wisely concentrating their labours and outlay upon more profitable fields of inquiry. The continents of South America, of Africa, and Australia, and the great Empire of China, offer better prospects of success for exertions, whether for mere fame and adventurous exploration, or the more attractive advantages of trade profit, in the discovery of new and useful products, or fresh outlets for our commerce and manufactures.

In the list of premiums announced by the Highland and Agricultural Society of Scotland this year, I perceive a gold medal offered for an approved report on the hardy and useful herbaceous plants, including grains and grasses of China, Japan, the Islands of the Eastern Archipelago, and South Seas, the Himalaya country, &c.

There is one extensive and populous field—the great Indian Archipelago—which is comparatively unknown to the mass of the British people, but which has of late years been opened up to us, and certainly offers great advantages for the future extension of trade and commerce. Of the interior of many of those fine islands, of the extent of their population, and of the nature of their products, we absolutely know nothing. It is rather, however, with the desire of stimulating inquiry than in the hope of adding much that is new to our stock of information, that I have undertaken to open up the discussion by a paper on the Trade and Commerce of the Eastern Archipelago. With a gentleman occupying the chair who is so well informed on this subject, who has a world-wide reputation for his labours and his writings on Eastern geography and trade, and whose experience extends over nearly half a century, I may even be considered bold in attempting it.

But while there have been issued, from time to time, numberless publications devoted to this interesting region, they are for the most part special in their object, and scarcely serve to give anything like a popular bird's-eye view of the commerce of the countries comprehended within the area. Not that I can expect to give, in the brief time allotted me, anything like a comprehensive digest of a field on which Mr. Crawfurd has published a work in three volumes, and more recently a descriptive dictionary extending over 450 pages. Having, however, paid some attention to the trade products of the far East, the commercial statistics of that quarter, and the various publications issued, I will endeavour to place before the members, in a condensed form, some of the most interesting details connected with a few of the principal islands of the group.

The islands comprised under the collective term of the Indian, Asiatic, or Eastern Archipelago, are supposed to number upwards of seven or eight thousand, many of them of great extent, with a numerous population. Although there are no very specific data to guide us in estimating the aggregate population of these islands, it may be fairly assumed at 30,000,000 of persons. The Dutch and the Spaniards exercise the principal jurisdiction among these islands, for the British settlements comprise only Singapore, and the small island of Labuan, if we except Sarawak, which is disclaimed by our Government.

The direct British trade with the far East is at present only on a limited scale, but there is every reason to believe that it may be very largely extended year by year, as there is a constant demand for new commercial products, very many of which are to be obtained in that quarter in great abundance.

The value of the exports of the produce of the United Kingdom to this Archipelago, in 1859, was as follows:—

To Singapore	1,421,067
Java	1,135,071
Philippines	685,490
Celebes	372
	£3,242,000

And of the imports direct:—

From Singapore	1,108,235
Java	250,320
Philippines	756,576
Borneo	11,218
	£2,126,349

With Borneo and Celebes a small direct trade has sprung up within the last three or four years.

The whole present expenditure for Consular salaries in this wide and prolific field of trade is but £2,800 a year, namely, £500 to the Consul General of Borneo; in the Philippines, £1,000 to the Consul, and £300 to the Vice-Consul at Manila, and £400 each to Vice-Consuls at Sual and Iloilo; at Java, £200 a year to the Consul at Batavia. The Consuls at Surabaya and Samarang, who received £200 per annum each, have this year been done away with. Now we spend more than this for consular services in the Pacific, though the British trade there is certainly not to be compared in extent and value with that of the Eastern Archipelago. The salaries paid to Consuls in the Pacific are Sandwich Islands £1,000; Feejee, Tahiti, and Society Islands, each £500; and Navigators' Islands, £450; total, £2,950.

The tables, Nos. 1 and 2 show the entire area of the islands of the Indian Archipelago as far as it is possible to arrive at it, and that of the islands and parts of islands con-

sidered by the Dutch to belong to them. From this statement, taken from an official periodical published in Holland, it appears that five-sixths of the whole Archipelago are regarded as Dutch possessions, and that amongst them are included all Sumatra, with the exception of Acheen and Siak; three-fourths of Borneo, that is, the whole island, with the exception of the north-east peninsula and a narrow band along the north-west coast, terminating at T. Datu; the whole of Celebes, Bali, Lombok, &c. It would be interesting to know whether the British Government is in possession of copies of all the treaties and acts of cession, on which the right to all the parts of this magnificent colonial empire that have been acquired since 1824 is based.

TABLE I.—SUPERFICIES AND POPULATION (AS FAR AS CAN BE ESTIMATED) OF THE INDIAN ARCHIPELAGO.

NAMES.	SQUARE GEOGRAPHICAL LEAGUES.	POPULATION.
SUMATRA	8035·0	2,500,000
Islands along the W. Coast of Sumatra:—		
Pulo Babi	30·0	
Pulo Nias	75·	
Pulo Mintao, or Siberu	30·	
Sepora Islands	75·	300,000
Poggi ,,	35·	
Engano and other small Islands	25·	
JAVA	2313·	12,000,000
MADURA	97·3	
Islands near the Coast of Java:—		
Pulo Bawean, and Kangeang Isles	21·9	
Islands in Straits of Sunda, the Krimon-Java Islands, &c.	12·4	
BANKA	223·	49,500
BILLITON	119·	12,864
Islands near Billiton, in Straits of Gaspar Banka	7·	
Archipelago of Rhio and Linga:—		
Bintang	21·	30,000
Linga	17·9	
Battam	8·0	
Sinkep	9·5	
Johore Archipelago	36·0	10,000
BORNEO	12743·1	1,800,000
Islands along the W. Coast of Borneo:—		
Pulo Buang Orang, or Great Natuna	29·	
Islands near Great Natuna	1·	1,600
South Natuna Islands	4·	
Pulo Jimaja	3·5	
Pulo Mata	2·	
Anambas	4·7	
Tambelan, or Timbalan, Islands	7·	1,000
Carimata, &c.	8·	
Other small Islands near the W. Coast of Borneo	6·	
Pulo Laut	45·	
Islands along the E. Coast of Borneo:—		
Pamaruang	30·	
Balabalaga	6·	
Maratua	21·	
Tarakkan Leegetan, &c.	16·	
Sulu and Basilan Islands:—		
Sulu	18·	60,000
Other Sulu Islands	3·3	
Tapul Islands	5·2	
Pangutaran Islands	5·	
Samar Laut Islands	2·5	
Basilan	22·2	
Islands near Basilan	1·5	
Tawi Tawi Islands	26·	
Islands near N. point of Borneo:—		
Cayagne, Caluja, Cavilli, St. Michel, and Cayagan-Sulu	2·4	
Balabak, Banguey, &c.	26·3	
CELEBES	3578·0	1,100,000
Bouton	86·2	60,000
Pengasan	46·5	
Other Islands to the S. and W. of Celebes:—		
Tukan-besi, Kambyna, Saleyer, and Islands to the S. of it	45·	
Islands to the W. of Celebes.	9·	
Islands along the E. Coast of Celebes:—		
Xulla and Bangaai	113·0	12,000
Islands of the Bay of Gorontala	10·	
Islands to the N. of Celebes:—		
Sangir	13·	
Siauw, Tagolanda, Bejaren, &c.	7·	
Talaut, Meaugis	18·	
BALI	105·3	700,000
LOMBOK	103·5	450,000
SAMBAWA	278·	
FLORIS OF ENDE	252·	
Islands to the E. of Floris:—		
Comado and other Islands in the Straits of Sapri	16·	
Adenara	8·	
Solor	5·	
Lombatta	24·8	
Putare	13·1	
Ombaai	45·8	
Other Islands	1·5	
TIMOR	613·	1,646,605
Islands to the W. of Timor:—		
Samao	8·4	3,000
Rotti	30·8	
Savu	11·3	5,000
Other Islets	5·5	
SUMBA OF SANDALWOOD	236·5	
Islands of the S.W., Wetter, &c.	110·0	82,000
Tenimber Islands	150·	22,000
Arru or Aroe Islands	65·	80,000
Kei Islands	60·	
Islands of the S. E.	14·	
Islands of Banda	1·1	5,200
CERAM	309·0	25,000
BURU OF BOURO	164·	
Islands S. and W. of Buru:—		
Amboyna	13·3	188,728
Other Islands	5·0	
Obie Besar	39·	
Islands near Obie Besar	7·	
HALMAHERA OF GILOLO	313·5	5,000
Islands near Gilolo:—		
Batchian	50·0	
Ternate	0·7	89,076
Tamally, Mandoli, Latta, Tidore, and other Islands	48·8	
Waigin	60·	
Battanta	13·	
Salawattie	33·	
Misole	37·	
Islands near these	30·	
TOTAL	31428·	21,238,573

It will be remarked that the Malay Archipelago, the Philippines, and New Guinea, are not included in this table.

In an investigation of the trade of the Eastern Archipelago, our first inquiry must be with the island of Singapore, which is the great commercial emporium of that quarter, and which owes its prosperity not only to its convenient situation, but also to its being a free port, without any charge whatever, except a small one for light dues, from which even native vessels are exempt.

Two years after its establishment, the fixed inhabitants of Singapore numbered but 12,000; now they have risen to 80,000, of whom about 50,000 are Chinese. 8,000 or 10,000 Chinese arrive every year; these either settle in Singapore or proceed to Malacca. Singapore produces annually and ships about 5,000 tons of gambier, better known in England as Terra Japonica, 6,000 or 7,000 tons of sago and sago flour, and 1,250 tons of pepper. Being also the entrepôt of the Eastern Archipelago, all the products of the various islands are received there for shipment to Europe. Some 2,000 or 3,000 prahus and junks visit the port annually from Bali, Borneo, Celebes, Sumatra, Java, and the neighbouring islands, from China, Siam, and other parts of the Continent.

The Bugis trade, commencing in September and ending in November, is generally esteemed by the local merchants as second only to the trade with China. The junks from China are a larger class of vessel and of considerable burthen. Singapore is also largely frequented by square-rigged vessels. About 700,000 tons of shipping annually enter the port. The number of square-rigged vessels which arrived at Singapore during the official year 1858-59 amounted to 1579, (of which 1,027 were British), with an aggregate tonnage of 650,285. This was in excess of the number of the previous year by 171 vessels and 63,358 tons. The number of vessels which sailed from Singapore in 1858-59 was 1,239 (British 692), with a tonnage of 467,887, showing an increase compared with the preceding year of 203 vessels and 66,083 tons. In 1858 the value of the imports was £6,700,000, and of the exports £5,783,600. In 1859 the aggregate value of the trade was rather less, being only eleven millions sterling.

The great extension of British trade with China, Siam, Java, Borneo, Japan, and other Eastern countries, has greatly benefited Singapore, which may be looked upon in the light of a large bonded warehouse.

Already the trade of Singapore is more than a third of that of Bengal, and the resources of the whole eastern part of the Continent and Archipelago when developed must flow through it. There exists no reason why the trade which in 40 years has increased eleven fold, should not in the remaining forty years of the century be at least tripled. Governed as a separate colony, with a strong municipality, Singapore in the year 1900 may be the bonded warehouse of all Southern Asia and the East, the exchange for a trade of 50 millions sterling a year.

SINGAPORE EXPORTS

To Great Britain.		1860.	1859.
Gambier	piculs, 133 lbs.	164,510	171,907
Tin	,,	12,645	19,717
Sago flour	,,	101,883	90,557
Pearl sago	,,	29,833	44,105
Black pepper	,,	52,998	45,817
Tortoise-shell, catties		6,581	5,680
Mother-o'-pearl shells, piculs		331	688
Gutta percha, piculs		21,076	14,787
Nutmegs and mace, piculs		543¼	505
Camphor	piculs	445	—
White pepper	,,	12,522	13,764
Benjamin	,,	602	50
Gamboge	,,	75	45
Antimony ore	,,	53,230	—
Coffee	,,	9,726	16,647
Sapanwood	,,	13,010	30,790
Sticklac	,,	551	150

SINGAPORE EXPORTS.

To the Continent of Europe.		1860.	1859.
Tin	piculs	5,041	2,446
Gambier	,,	44,414	30,350
Pearl sago	,,	13,853	8,816
Sago flour	,,	4,523	202
Cassia	,,	550	417
Black pepper	,,	30,720	24,076
White pepper	,,	1,706	439
Tortoise shell	,,	2,108	—
Gutta percha	,,	234	—
Coffee	,,	11,796	8,547
Sapanwood	,,	2,046	2,678

To India—specie and bullion: gold dust and bars, value, 94,855 dols.; dollars, no., 167,163; rupees, no., 36,221: other treasure, 341,094 dols. Japan copper, 110 piculs; black pepper, 8,858 piculs; tin, 4,073 piculs; gambier, 5,928 piculs; alum, 783 piculs; camphor, 1,102 piculs; sapanwood, 34,392 piculs.

To China the exports for 1860 were—opium, Patna, 59 chests; Benares 194; Malwa, 70. Cotton, 18,399 piculs; black pepper, 3,779; betelnut, 17,491; rice, 429,127; rattans, 13,245; ebony, 2,839; and sapanwood, 4,105 piculs.

To United States in 1860—gambier, 76,840 piculs; tin, 9,353; sago flour, 4,815; pearl sago, 1,145; black pepper, 23,066; cassia, 236; gutta percha, 75; nutmegs and mace, 457½; camphor, 41; india-rubber, 463; coffee, 7,240; sapanwood, 1,187 piculs.

The revenue of Singapore for the last official year was £77,466, being less than the preceding year by about £8,000. The expenditure amounted to £97,105. There is thus an apparent deficiency of about £19,640. The official returns of the trade of Singapore for the year ending 30th April, 1860, make the amount of imports £4,719,914, being less than that of the previous year by £958,970. The exports were to the value of £5,651,388, showing an increase over those of the previous year of £522,731. No statements have yet been published giving details of the trade or of the shipping which arrived at or departed from Singapore during the year. From the monthly statement of the trade of Singapore published in the *Free Press*, we find that the value of the imports up to the end of 1860 was estimated at 25,130,681 dollars, being an increase over 1859 to the extent of 1,194,725 dollars. The value of the exports in 1860 is put down at 19,780,612 dollars, being less than in 1859 by 2,874,851 dollars. The imports were brought as follow, by

1,067	square-rigged vessels	dols. 21,273,772
2,325	native ,,	3,856,909
3,392		25,130,681

The exports were taken as follows, by

1,092	square-rigged vessels	16,345,642
2,647	native ,,	3,434,970
		19,780,612

The past year (it is observed) was, on the whole, an unfavourable one for the trade of Singapore. There was a considerable falling off in the exports of several articles of produce, such as tin, gambier, sago, coffee, sapanwood, &c., while there was very little speculation in rice as compared with the two preceding years. The state of affairs in China operated very disastrously to the Chinese merchants engaged in extensive transactions between Singapore and that country, and the trade with Siam also seems to have been overdone in past years, and there was consequently a reaction in 1859 and 1860, many of those who had entered into it largely making heavy losses. During the latter part of 1860 a number of failures also occurred among the Chinese traders.

The British goods sent to Singapore, in 1859, consisted

of arms and ammunition to the value of £19,000; copper, wrought and unwrought, £52,331; hardware and cutlery, £13,000; iron, £51,300; machinery, £7,250; telegraphic wire, £70,000; glass, £7,750; earthenware, £14,687; coals, £13,000; apparel, &c., £8,143; cottons and cotton yarn, £975,563; linens, £26,000; woollens, £62,274.

The greater portion of our cotton manufactures, sold in Singapore, are consumed in the less civilised quarters of the Indian Archipelago, where the natives prefer cheap goods and gaudy patterns, while those of Java select and prefer Dutch or Indian manufactures which, though dearer, are said to be more durable than British goods.

Our direct imports from Singapore, (taking the official returns of 1859 as an estimate,) are, of minerals, 860 tons of antimony ore, the produce of Borneo, and 17,549 cwt. of tin, chiefly from Malacca. Of animal substances, 10,000 or 11,000 cwts. of hides; 33,662 lbs. of silk, probably from Japan or China; 10,000 lbs. of tortoiseshell, and 1,373 cwts. of mother-of-pearl shells. Of dyestuffs and tanning substances, there were 132 cwts. of gamboge; 102 cwts. of stick-lac; 941 tons of cutch, and 9,161 tons of gambier—the terra japonica of commerce. Of elastic gums, 17,368 cwts. of gutta percha, and 1,114 cwts. of India rubber; of copal, about 68 cwts., and of unenumerated gums, 796 cwts. 10,000,000 rattans were received, and 899,000 other canes. Upwards of 34,000 cwts. of sugar, 175,000 cwts. of rice, and 1,704,000 lbs. of coffee; a considerable quantity of this coffee is brought from the north coast of Bali, the greater portion being smuggled from the eastern districts of Java, where coffee is a Government monopoly. 47,000 lbs. of nutmegs and 15,000 lbs. of mace, most of this the produce of Singapore, but some from the Eastern Islands, as the long and wild nutmegs. About 6,500,000 lbs. of pepper came through this channel, 9,513 lbs. of cassia oil, and 40,000 lbs. of other essential oils.

Singapore is at present the chief place of manufacture and principal mart for granulated sago and "sago flour," as it is termed in commerce, but in fact the fecula or ungranulated starch. The granulated fecula of sago of a dirty brown colour, used to be exported from the Archipelago in small quantities, but when the trade with Europe was thrown open, in 1814, the Chinese of Malacca began to prepare a superior article, known in commerce under the name of pearl sago. There are four or five species of palms which yield sago, the most cultivated of which are, however, the *Sagus Konigii* and the *Sagus laevis*. These palms are found in every part of the Malayan Archipelago and Philippines, as far as Mindanao, wherever there is a genial soil for them, and this soil consists of a marsh or bog, composed of decayed vegetables, near the sea. They are most abundant in the eastern parts of the Malay Archipelago, at the Moluccas and neighbouring islands, with New Guinea and Borneo, and in the Philippines at Mindanao. In all these they are more or less the bread of the inhabitants. These palms propagate themselves by lateral shoots, as well as by seed, and they die after producing fruit. From the first of these properties it follows that a sago plantation, once formed, is perpetual.

The sago tree, when cut down and the top severed from it, is a cylinder about 20 inches in diameter, and from 15 to 20 feet in height. The contents would, therefore, be nearly 26 bushels, and allowing one-half for woody fibre, there will remain 13 bushels of starch, or say 700 lbs. It may give some idea of the enormous rate of this produce, if it be considered that three trees yield more food matter than an acre of wheat, and six times more than an acre of potatoes. It is far from being either so palatable or nutritious as it is prolific, and is never preferred, even where it is most abundant, to rice.

All the raw sago manufactured at Singapore is brought from islands to the eastward, principally from the North-West Coast of Borneo and the North-Eastern of Sumatra, with its adjacent islands from Siak to Indragiri, but a considerable portion comes from places more than 1,000 miles distant. This article is very easily prepared for exportation in its raw state; the tree is cut down, then the pith or cellular tissue is taken out, and made up into bundles. In this form some 15,000 or 20,000 tons are annually imported at Singapore, where it is prepared by the Chinese, who clear the meal or farina from the fibres of the pith or cellular tissue, when the flour is either made up for exportation in its natural state or is granulated into pearl sago. The imports of sago have steadily increased, especially since the reduction of the duty to the nominal amount of 4½d. per cwt., in 1853. In 1830 the import and consumption of sago in the United Kingdom was only 3,000 cwt.; in 1841 it was 52,000 cwt. In 1850, the imports were 90,000 cwt., and in 1859, 168,805 cwt., valued at £140,000.

The trading prahus (commonly proahs) of the Malays, with the low fore ends, projecting stem and gallery, bamboo decks and mat sails; the Arab dows, with bowsprit and bow consolidated in one, coir rigging and hair cables, the odd-looking craft from Macassar, Celebes, and of the Bugis, all poop, and boats of most primitive build and uncouth rig, and the Chinese junks, give a singular appearance to the waters.

Some articles of their lading are curious, especially the food dainties. The widely-famed edible nests of the swallows, are torn from the recesses of the slimy caverns of Karong-Bolang, on the western coasts of Java, and destined to form a luscious potage for Chinese sensualists.

Sharks' fins and fish maws, trepang, a hideous sea slug, gathered on the reefs of New Guinea and Australia, dried cuttle fish and dried oysters, dried prawns, deer's sinews and dendeng, or sun-dried meat, seaweed and seaweed isinglass, and several other Oriental delicacies, are included in these cargoes, and regularly quoted in prices current, with all other descriptions of merchandise.

Agar-agar, an edible seaweed, much in use in the East, is obtained of the second quality from Macassar (Celebes). It is collected on the submerged banks by the Bajou Laut, or sea gypsies, as they are termed, for export to China. This fucus is much used for making a kind of jelly, which is highly esteemed by Europeans and natives for the delicacy of its flavour.

Sumatra is about 1,000 miles in length, with an area reckoned at 128,560 geographical square miles, or half as large again as Great Britain. It was not until the restoration of their possessions in the Archipelago to the Dutch, in 1816, and especially since the convention with the English, in 1824, that the government of the Netherlands began to pursue a territorial conquest in Sumatra, through which they have become masters, at least nominally, of the whole of its coasts and islands, from Kampar, on the Straits of Malacca, to Singkel, on the western coast, bordering on the territory of Achin, with much also of the interior of the island.

The mineral products adapted to economical use hitherto discovered in Sumatra are coal, sulphur, naphtha, granite, marble, iron, and gold. Indications of copper have been discovered, but no mines of it have ever been worked. The iron ore is described as of fine quality, and iron and steel have been immemorially made from it by the workmen of Menangkabo, who have attained a local reputation for the manufacture of tools and weapons.

Gold is found in many parts of the interior, but seemingly not in such abundance as in Borneo, the Peninsula, or Celebes. I saw it stated some time ago that the coal mines of Indragiri, on the east coast, two or three days' sail from Singapore were about to be worked by the firm of Almeida and Sons, who had entered into an agreement with the sultan of that place. If this be so, Singapore will have three sources of coal supply within its immediate neighbourhood, the others being Labuan and Sarawak. As the coal from Indragiri can be brought to Singapore in native boats at a cheap rate of freight, the working of the mines in Sumatra will give a fresh impulse to steam navigation in those seas. Sumatra produces all the corn, pulse, farinaceous roots, and esculent fruits which belong to other portions of the western part of the

Archipelago. Its eastern coast, and the islands lying off it, are the chief source of the sago of commerce. Benzoin and Malayan camphor are peculiar to it and Borneo. Sumatra is the great source of black pepper, producing far more than all the other countries of India put together.

Pepper is also grown in the Peninsula, Borneo, Java, and to a small extent in some of the Philippines. By far the largest supply is furnished by the western side of Sumatra, which exports it from no fewer than 14 different ports, the entire quantity being estimated at 22,000,000 lbs., and 9,000.000 is exported from the eastern side of the island. The Malay peninsula, Borneo, and the western part of Java, produce probably about 8,000,000 pounds more, bringing up the total supply from the East to about 40,000,000 lbs. Strangely enough, this spice is never used as a seasoning by the natives, nor do they appreciate the nutmeg or clove.

The Lign aloes, or eagle wood, agala, or Calamback of commerce, is obtained of a superior kind from Sumatra. If of good quality it should melt in the fire like wax, yielding an agreeable odour. Cotton grows in Acheen and Palembang, and samples were shown from thence at the Exhibition in 1851.

Of late years coffee has been raised in larger quantities than in any other island except Java, and this production has even extended to the native cultivators, so that the island promises to furnish an almost unlimited supply. The coco and areca palms grow well.

In Sumatra we meet with the Ejoo or Gomuti palm, there called Anau (*Arenga saccharifera*). It is one of the most useful and abundant of all the palms in the Eastern islands.

It grows 20 or 30 feet high, and yields bunches of small fruit, the interior of which are prepared and extensively used by the Chinese as sweetmeats. It is readily distinguished from other palms by its rude and wild aspect. The Portugese name for this tree is Sagweir; the Malays call it Gomute, and the Javanese Aren and Doh. (See Griffith's "Palms of British India," p. 164 to 235). It is chiefly an inhabitant of the mountainous ranges and narrow damp vallies of hilly countries. Plantations of it are abundant in Java. It is raised from the seed. The tree arrives at maturity in ten years, and is productive for about two. It yields several valuable products, among which are a species of tinder, a fibrous elastic material like horse-hair, and a large quantity of sap containing an abundance of saccharine, from which sugar is extracted and a fermented liquor or toddy is made. The Moormen are said to use the very thick fibres as pens. Like the true sago palm, the medullary substance affords a small but inferior quantity of farina. The fibre so much resembles horse-hair as scarcely to be distinguished from it. It envelopes the trunk of the tree, about the bases of the petioles of the fronds, and might be had in large quantities from Singapore, Sumatra, Amboyna, and other of the eastern islands. That of Java has a coarse ligneous fibre. It is, of all vegetable substances, the least subject to decay. The small cordage of most of the Malay proahs is made of it, and it is even manufactured into hawsers and cables, equally elastic with coir, and much more durable. They will float on the surface of water. Gomuti is generally sold in twisted shreds or yarns—often as low as 4s. a cwt. Were European ingenuity applied, says Mr. Crawfurd, to the improvement of this material, there seems little doubt that it might be rendered more extensively useful. This is probably the same tree from which the fibres, called Cabo-negro by the Spaniards, are procured at Manila, and from which they also manufacture rope. About two crops of this fibrous material are obtained from the palm during its lifetime, each averaging about 9 lbs. It is found between the trunk and branches, at the insertion of the latter, in a matted form, interspersed with long, hard, woody twigs, from which it requires to be freed. Underneath the hair-like material is found a third substance, of a soft gossamer-like texture, which is in large demand in China as tinder, and for caulking ships in the same manner as oakum. I have seen this palm growing in some parts of Jamaica, and I believe it is to be found in other of the West India islands.

According to Sir W. Hooker and the late Dr. Royle, no fibrous substance can rival in tenacity the Gomuti fibre, which is imported sometimes under the name of vegetable bristles. It resists wet to an astonishing degree, thus being particularly adapted for ships' cables and cordage. Each full-grown tree of this kind throws off about six leaves a year, which collectedly furnish $4\frac{1}{2}$lbs. of Gomuti fibre — sometimes rather more. The fibre may also be removed without injury to the stem. They occasionally measure a yard in length. Three Russian hemp cables have been known to break under a strain which was resisted by a rope made of these fibres, a fact attested by one of the most celebrated ship-builders in Calcutta.

The island of BANCA has an area of about 3,568 square miles. There are timber trees of great size on it, some of them useful. The most valuable products of the forest for trade are *agila*, or eagle wood, ebony, and beeswax.

The bee of the Indian Archipelago does not make its nest in hives as in Europe, but suspends it from the branch of a tree, in which position they may be seen forming masses of considerable bulk. Certain trees become favourites, and are selected by them yearly for many generations, although often disturbed by the taking of their nests. These trees become private property among the Eastern tribes, and are handed down from father to son.

Banca is noted for its tin mines. The digging, washing, and smelting the alluvial tin ore, is entirely in the hands of the Chinese, who receive advances from the Dutch Government, which exercises a monopoly of the produce. The quantity produced in 1853 was no less than 5,540 tons, a quantity approaching nearly to the produce of our Cornish mines, (6,920 tons,) and, being all grain tin, superior to it in value. The government pays to the miner, on an average, about eight dollars for each picul of the metal. The finest ore yields as much as 80 per cent. of metal; the commoner sorts from 40 to 60.

BORNEO is undoubtedly the largest island in the world that can properly be called so, New Guinea alone approaching to it in magnitude, for it has a coast line estimated at 2,000 miles, and an area computed at 263,600 square miles, which will make it six or seven times the size of Java, and three or four times the size of Britain. There is much dispute as to the probable amount of the population. Mr. F. Boucher states it about 1,316,000, of whom the bulk, 1,000,000, are Dyaks or aborigines; 200,000 Chinese and Cochin Chinese, and 100,000 Malays. The Dutch functionaries compute the population under their rule (two-thirds of the whole island) at 1,348.000, and Mr. Crawfurd considers the entire population overstated at 1,800,000.

The whole island is covered with rank verdure, or a primeval forest of gigantic trees, the cleared and reclaimed spots forming but exceptional specks in this wild and unvaried landscape. The indigenous exchangeable vegetable products of Borneo are benzoin, eagle wood, native camphor, the sago palm, and rattans. In the general markets of the Archipelago, the rattans, the produce of Banjarmassin, on the southern side of the island, are more valuable by 7 per cent. than those of any other country.

Some imports have occasionally been received of a concrete oil termed Borneo vegetable tallow, which is obtained by boiling the cotyledons of an undefined tree. Dr. Adams ("Voyage of the *Samarang*") has referred it, certainly erroneously, to the fruit of one of the *Bassias.* The Borneo vegetable tallow is made up into large round flattened cakes, of the consistence and colour of cheese, and also in cylindrical masses, which have assumed the form of the bamboo joints into which it had been poured when in a liquid state.

Gold has been found in alluvial deposits on parts of the island. Antimony is obtained at Sarawak and Bintula. Coal crops out in various places on the north-western side

of the island, and again on the southern side of the island, and if these, as is probable, are the extremes of the same carboniferous formation, the coal-fields extend over about 8° of latitude and 2° of longitude, and, after those of North America, must be the largest in the world. The great importance of an adequate local coal supply in the Indian Archipelago cannot be over-rated, in view of the present steam navigation and its probable extension among the islands, on the coast, and up the Chinese rivers. Besides the British steamers, the Dutch, Spanish, Russian. and Japanese are daily extending their local steam-fleets, and even the King of Siam now owns several. Steam navigation will do more to promote trade and suppress piracy in the Archipelago than any other element.

In 1846, the value of the imports at Singapore from Borneo was £109,220, the principal items being, antimony ore, 20,190 piculs; betel-nut, 2,441; bird's nests, 180 piculs of bla.k, and 6 of white; Malay camphor, 21 piculs; pepper, 2,900 piculs; rattans, 20,000 piculs; raw sago, 180,400 bundles.

In 1845, Sir James Brooke acquired of the Sultan, by cession, the fine province of Sarawak, on the western coast. This spacious and fertile district extends for nearly 100 miles in every direction from the town of Sarawak, and is in many respects extremely eligible as a site for a British settlement in Borneo. It is unnecessary here to go into the political bearings of the question, and to record the efforts which have been made, backed by mercantile representations from the leading manufacturing and commercial towns of the United Kingdom, to induce the Government to take over, under some pecuniary arrangement with Sir James, the control of Sarawak. This province is said to yield in abundance all the rich and varied productions of Borneo, of which many samples are placed before you this evening.

In illustration of its natural advantages, I may quote, from the "Journal" of Sir James Brooke, what is fully borne out by all who have visited and traded with it.

"For the country, what shall I say? I could not wish a richer; its soil is fine, and admirably calculated for the culture of rice, coffee, nutmegs, or cotton. There is a noble river flowing through the territory. The southern boundary is defended by a range of mountains of an elevation which affords an European climate; and the climate generally is healthy and cool. The mineral productions are rich. Then we have woods which would supply all the dockyards in Europe, and of the finest quality; for though we do not boast of teak, we have other timber equally hard and durable."

On the 22nd February this year, a grand *fête* was given at Sarawak, by Mr. Helms, the manager of the Borneo Company, to inaugurate the opening of their extensive steam-machinery. The machinery was set in work by Sir James Brooke, and worked admirably. It is calculated that this manufactory will turn out ten tons of sago flour or tapioca per diem. The process is similar to that of starch-making in England. It is simple, and promises to be very economical, compared with the rude process of the Chinese. Connected with this factory are extensive saw mills, &c. Great credit is due to the active manager of the company in Sarawak, for the successful erection of this complicated machinery under great difficulties. As soon as it was known that the company intended to manufacture tapioca, considerable quantities of the *haya ubi* were brought from the neighbouring islands, and its cultivation on a large scale has been commenced in Sarawak by Chinese, Malays, and Dyaks. The machinery is adapted to the manufacture of sugar, and the cultivation of sugar-cane is also being entered on with great zeal by the natives.

The steamer *Rainbow* now runs twice a week between Singapore and Sarawak, carrying the mails, passengers and light cargo, and this increased communication will do much to advance the interests of the settlement.

Ship-building is being prosecuted with spirit, and this branch of industry is capable of being largely developed, the forests of Sarawak affording inexhaustible supplies of suitable timber. A handsome schooner, of some 150 tons was lately launched at Kuching.

Subjoined is a statement of the trade of Sarawak for the last seven years. The result presented is satisfactory, but it would have been much more so had not the unfortunate suspension of the trade with Muka occurred last year:—

COMPARATIVE STATEMENT OF TRADE, REGISTERED AT THE PORT OF SARAWAK, EXCLUSIVE OF THE TRADE REGISTERED COASTWISE.

YEAR.	IMPORTS.		EXPORTS.		TOTAL.	
	Tons.	Value. Dollars.	Tons.	Value. Dollars.	Tons.	Value. Dollars.
1854	9,656	319,639	11,452	352,195	20,908	671,834
1855	10,750	304,764	11,794	315,757	22,544	620,521
1856	13,332	355,927	14,142	318,154	27,474	674,081
1857	11,611	282,572	11,424	252,333	23,035	534,905
1858	13,427	335,353	16,306	394,699	29,783	730,052
1859	17,431	405,456	19,960	433,490	37,391	838,946
1860	15,240	400.226	17,591	514,389	32,831	914,615

The town of Brunei, situated on the river of that name is the principal of the Malay settlements on the island, and the capital of the Sultan. It is a place of considerable magnitude, and its population is considered to number more than 20,000 persons. The British Government at the instance of Sir James Brooke formed an alliance in 1848 with the Sultan, and obtained from him the cession in perpetuity of the little island of Labuan, situated opposite to the entrance of the river Brunei.

Mr. St. John, British Consul-General in Borneo, in his report to the Foreign Office of the trade in Brunei town for the year 1857, stated that the exports, with the exception of sago flour, consist principally of jungle produce, as punk or tinder, rattans, edible bird's nests, camphor, beeswax, and gutta percha. The small quantity of pepper grown is principally exported to Labuan; this produce is, however, increasing, and the infusion of capital would rapidly extend its cultivation. Tobacco is planted rather extensively, affording sufficient supplies for this nation of smokers. Cotton is grown in small quantities in almost every district, while coffee is confined to the neighbourhood of the capital, and rice is not produced in sufficient quantities to supply the inhabitants. The following is an account of the trade to Singapore in British vessels,—the amount of the imports and exports in native vessels is not attainable:—

The British imports principally consist of cotton goods —as grey and white shirtings, coloured cottons, chintzes, &c., to the value of 122,594 dollars, together with crockery, steel, iron, and salt, with a few more expensive articles for the nobles.

The principal exports were, 38,510 cwt. of sago flour, valued at 69,546 dollars; white bird's nests, 13,918 dollars; camphor, 14,507 dollars; miscellaneous, 22,184 dollars; 6,000 tons of coals, valued at 25,000 dollars, furnished to the navy, and shipped to Hong Kong and Singapore; together with 7,360 dollars'-worth of sago in Dutch vessels, making a total export of £30,503. The above is a very large increase on the trade of the previous years, and it is to be hoped that it will be found practicable to establish the cultivation of cotton, and extend that of pepper. A tin mine has been discovered in Maluan Bay, but no steps have been taken to work it; antimony is reported in the neighbourhood of the capital. Barus camphor, from Borneo, is named after a port in Sumatra, from which formerly the supply was chiefly obtained. It is much esteemed in China, where it is said to be used for flavouring the Chinese camphor, an inferior article obtained from a different description of tree.

Without dilating unnecessarily upon the value and importance of Borneo, it is but just to declare that, with regard to its natural advantages, there is not perhaps a finer territory in the whole world. In point of situation it is almost unrivalled; its productions are rich, varied,

and most abundant; the climate is fine and salubrious, and the country possesses, in an eminent degree, all the elements requisite for the formation of a wealthy and powerful state. A recent writer on this locality has well observed, that it is very desirable for the interests and prosperity of Great Britain, and for the welfare and improvement of the inhabitants of the island and surrounding countries, that the British government should acquire, by means of negotiation and purchase, the sovereignty of this vast and valuable country. If it be suffered to continue in its present condition, its resources will not be developed for many centuries, and it will hardly be disputed that, under British settlement and colonization, this fine country will prove more advantageous to the whole world than it can possibly be under any other government.

Now these remarks are somewhat in opposition to those of Mr. Crawfurd, who alleges that "all attempts on the part of European nations to establish a permanent territorial dominion in Borneo, will, in the long run, be baffled by the insuperable obstacles of an incongenial climate, a stubborn soil, a rude and an intractable population, and the absence of all adequate financial resources. Such dominion (he adds) no doubt has been established in Java, the Philippines, and Hindustan, with fertile soils, dense and docile populations, and large financial resources; but that is no reason for imagining it could be established in a sweltering jungle, occupied either by savages, or by rude, idle, and intractable barbarians." And yet, in speaking of Sir James Brooke's labours at Sarawak, after justly characterising him as a man of great enterprise, strong will, and ample courage and ability, Mr. Crawfurd says, "The result has been a great accession of population by immigration, consisting of Malays, Dyaks, and Chinese, and a large augmentation of trade, for in 1854 its exports are stated to have amounted to a million of Spanish dollars, and its imports to 800,000. Such a result, in these rude and anarchical countries, never fails to follow from any administration which gives a fair amount of security to life and property."

The island of Labuan, in a commercial point of view, is of little significance. The population is under 1,200, and, even with the aid of a large annual parliamentary grant, it has been difficult to raise revenue sufficient to meet the expenditure. The imports have averaged about £20,000 and the exports have ranged from £22,000 down to £6,000. The coal exports have been declining. In 1856, 5,539 tons were shipped; in 1858, none were exported. Between 1850 and 1857, 35,691 tons of coal were shipped from Labuan.

Of the Sulu Archipelago we know comparatively little. The people of Sulu and the Lanuns of Mindanao, are the most daring habitual pirates of the Malayan seas. Their predatory fleets extend their cruises from one end of the Malay Archipelago to the other, but the chief theatres of their depredations are, and always have been, the Philippines. These great piratical communities send forth periodically large fleets to scour the seas, and treacherously lurk along the shores of the Archipelago, despoiling the seafaring trader of the fruits of his industry and his personal liberty, and carrying off from their very homes the wives and children of the villagers as slaves. From the creeks and rivers of Borneo and Johore, from the numerous islands between Singapore and Rhiu, and from various other parts of the Archipelago, piratical expeditions are, year after year, fitted out. No coast is so thickly peopled, and no harbour so well protected, as to be thoroughly secure from all molestation, for where open force would be useless, recourse is had to stratagem. The Dyaks of the rivers of Serebas and Sabanan, on the north-west coast, have long been a terror to the inhabitants of that part of Borneo. The mouth of the Coti River, on the east coast, is also much infested with piratical prahus, which prey at pleasure upon such small craft as may unfortunately become becalmed at the entrance of Macassar Strait. The articles of commerce furnished by the Sulu and neighbouring islands, are chiefly the produce of the fisheries, pearls and pearl oysters, tortoiseshell, trepang, and edible birds' nests.

CELEBES is the fifth island in magnitude of the Asiatic Archipelago, and has an area of about 57,250 square geographical miles. Of the metals, copper and tin are stated to be found there, but iron and gold are the only two that are abundant, and respecting which we have reliable information. The last of these is very widely disseminated over the northern part of the island, and procured by the rude washings of the natives. More of it is exported than from any other island except Borneo. The sago, cocoa, and gomuti palms are natives of the island. The culture of coffee has recently been introduced by the natives, and the cacao in the northern peninsula. The civilised inhabitants excel in the manufacture of checked cottons, distinguished for their durability, and for the permanence although not the brilliancy of their colours. The raw materials are their own, and the women are the spinners, weavers, and dyers. These cloths are largely exported to the European and other emporia of the west, and maintain their place in competition with the manufactures of Manchester and Glasgow.

In the volcanic province of Minahassa, at the extreme end of the northern peninsula, there is considerable attention paid to agriculture, Rice, maize, the ground-nut, the gomuti and sago palms, tobacco, coffee, cocoa, and plantain fibre are among the staples. Cocoa, which is exported to Manila, is produced to the extent of about 200,000 lbs. yearly, Minahassa being the only country of the Malayan Archipelago in which this rather delicate tree has been successfully cultivated. In 1854, there were one million cacao trees. The coffee is of a very fine quality, and is considered superior to the best of Java. The amount produced is about 3,200,000 lbs. It is a monopoly of the government, which requires the delivery to it of all that is produced, at a fixed price, payable in a depreciated small copper coinage. In the beginning of 1855, there were about 5,000,000 coffee trees in Minahassa, but not all in bearing. In some districts the produce per tree is as much as one to two Amsterdam pounds ($2\frac{1}{4}$ to $4\frac{1}{2}$ lbs. avoir.), while in others it is only $\frac{1}{2}$lb. to $\frac{3}{4}$lbs. The formation of regular plantations was commenced in 1822. In 1827, the forced delivery of coffee in Menado was abolished, but the obligatory planting retained, and a duty imposed of 4 florins per picul. This system was changed in 1832 for that of a compulsory delivery of coffee at 15 florins per picul, and this was again replaced, in 1850, by the imposition of the new system of taxation, the price per picul ($133\frac{1}{3}$ lb.) being fixed at $8\frac{1}{2}$ florins on delivery in the government stores, which had been in the meantime established at different places in the interior. About 20,000 piculs of rice are grown yearly, but it is small in grain, and of a poor quality. Tobacco is generally cultivated, but only for local consumption.

The cultivation of the plantain (*Musa textilis*) for its fibre, here known as koffo hemp, has been largely entered upon, not only in Menado, but in all the districts of Minahassa. It is prosecuted under the encouragement of government, but entirely for the benefit of the planters. Mr. Jansen, the official resident, an experienced and talented officer, takes great interest in the cultivation, and gives it every assistance.

In 1853 there were planted in Minahassa 24,481 koffo plants; in 1854 above 38,000; while in 1855 the planting was very largely increased. There are probably already more than one hundred thousand koffo plants, which when they are fit for manipulation will give about a thousand piculs of fibre. The most extensive planting has taken place in the Amurang division. The above particulars refer only to the koffo culture on government ground. In the Minahassa there are, however, extensive lands which belong to private proprietors, mostly Europeans or their descendants, and which are planted with cacoa and nutmeg trees, cocoa palms and koffo plants. The koffo culture already occupies a large space on some of

these properties. Mr. Jansen, in an article published in one of the scientific periodicals at Batavia, noticed the interesting and novel fact, which has been ascertained by observation, that the koffo grows freely from the seed and not solely, as was formerly thought, from cuttings. The ordinary cultivated plantation, as is well-known, can only be propagated by suckers. The koffo fibres are prepared here in a very defective manner by a primitive machine of native manufacture, which requires a great expenditure of labour in proportion to the work it performs. The want of a more perfect means of separating the fibres is already felt, and will be more and more obvious as the preparation of the koffo requires to be accomplished on a larger scale.

In 1847 the Netherlands Government made Macassar on the S.W. coast a free port. It is a place of considerable native trade, and 400 prahus are said to belong to it, which trade with almost every commercial place from Sumatra to New Guinea, and carry on the trepang fishery on the northern coast of Australia with Chinese capital.

The trade with New Guinea and the Eastern Islands (commonly called Bugis trade), and the trepang fishery, is carried on chiefly in prahus or vessels of this description, which leave Macassar and other ports of Celebes for the eastern islands during the westerly monsoon, returning with the south-east trade wind.

In the markets of Celebes it is said that not fewer than 300 different species of fish are at one time or another offered for sale. A few of them are of excellent quality, equalling, if not surpassing, in delicacy of flavour those of the European seas. The curing of ordinary fish, and the pickling of prawns, form a considerable business on all the coasts of the island, and cured fish is a considerable branch of trade between the coast and the interior.

We now pass on to Java.—In 1846, Dr. Bleeker estimated the population of the Dutch colonies in the East at 10,000,000. In the close of 1859, according to official returns, they comprised 578,460 square miles, and the population was nearly 17,500,000, or five times that of the home population of the kingdom. The government and administration, home and foreign, of Java and the other Dutch eastern possessions, cost £5,726,619 in 1857, and £7,161,622 in 1858. But the revenue drawn from thence was more than a quarter of a million in excess of the disbursements, the balance being applied to make up the deficit of the Dutch colonies in the West.

The number of Europeans in the Dutch colonies in the East was 26,648, of whom 20,331 were in Java. This did not comprise about 11,000 belonging to the army. The Chinese numbered about 210,000; of these 140,000, were in Java, but the great bulk of the inhabitants, 17,000,000, are natives. The number of slaves, when the proposition of emancipation was mooted, in May, 1860, was estimated at 9,000 to 11,000.

Table II.—Superficies of the Netherlands Possessions in the Indian Archipelago.

Names.	Square Geographical Leagues.	Population.
Java and Surrounding Islands:—		
Java	2313·0	11,943,019
Madura	97·3	
Other Islands near Java	34·3	
Sumatra and Surrounding Islands:—		
Government of the West Coast.		
Residency of Padang and the Interior	250·0	1,551,231
Residency of Ayer Bangies and Tappanulie	525·	
Residency of Benkulen	740·	111,028
Kingdoms and States of the interior and along the East-coast, under dependency of the Government. (The country of the Battacs, the kingdoms of Kampar, Jambi, Indragiri, the district of Korinchi, &c.*)	2979·	
The Islands along the West Coast	270·	
Districts of Lampong, S.E. coast	535·	83,793
Residency of Palembang	1340·	471,061
Islands of Banka:— Residency of Banka.		
Banka	223·	49,500
Billiton	119·	12,864
Other Islands	7·	
Archipelago of Riu (Rhio):— Residency of Rhio.		
Bintang	21·	29,913
Linga	17·9	
Other Islands near these	53·5	
Natuna, Anambas and Tambelan Islands	47·1	
Borneo and Surrounding Islands:— Residency of Sambas.		
Kingdom of Sambas	248·1	335,340
Small Islands	0·6	
Residency of Pontianak.		
The kingdoms and provinces of Pontianak, Mampawa, Landakh, Kubu, Simpang, Sakadana, Matani, Tayan, Meliouw, Sangouw, Sekadou, Sintang, Melawi, Sepapu, Blitang, Silat, Salimban, Piassa, Jongkong, Bunat, Malor, Taman, Ketan, Punan, &c.	2452·1	553,343
Islands of Penembungon, Karimata, &c.	11·5	
Residency of Banjermassing.		
The kingdoms & provinces of Bulongan, Gunong Tebur, Tanjong, Kutei, Passir, Tanahbumbu, Tanah Laut, Duson, Bekompei, Banjermassin, Pulo Peitak, Kabajang, Kupuas, Mendawi, Sampit, Pembuang, Kottawaringen, &c.	6519·9	
Islands of Laut, Nanka, Maratua, &c.	108·0	
Islands of Celebes and the Moluccas:—		
Government of Makasser.		
Part of the Island of Celebes	1674·0	215,277
Island of Sumbawa	278·	
Islands of Bauton, Saloyer, &c.	186·7	
Government of the Moluccas. Residency of Amboina.		
Amboina	13·3	188,728
Part of Ceram	254·	
Bouru	164·	
Other Islands	5·	

* In this number are comprised all the small States of Sumatra, except those which compose the kingdoms of Achin and Siak, of which the superficics is estimated at 924, and 732 square geographical leagues.

TABLE II.—(*Continued.*)

Residency of Thenadi.		
North part of Celebes	1433·	110,749
Islands of Siao, Sangir, and Tulour	38·	
Islands of the Bay of Gorontalo	10·	
Residency of Ternate.		
Part of Celebes	471·	89,076
Islands Xulla and Bangay	113·	
Halmahera (Gilolo)	313·5	
Islands Obie, Batchian, Ternate, Tidore, &c.	144·7	
Islands Waigiu, Battanta, Salawatti, Misole, &c.	173·	
Residency of Banda.		
Islands of Banda	1·1	110,179
S. E. part of Ceram	55·0	
S. E. Islands Kei, Arru, Tenimber, and South West	399·0	
ISLAND OF TIMOR, &c.:—		
Part of Timor	361·	1,646,605
Islands Rotti, Savu, Sumba, Ende, Adenara, Solor, Lombatte, Pantare, Ombai, &c.	660·3	
Islands of Bali, and Lombok	208·8	32,170
Total of Netherlands Possessions in the Indian Archipelago	25,872	17,528,876

In this total is not comprised the Western Part of New Guinea recognised as Dutch.

The Governor-general of Netherlands India, in 1858, proclaimed, under a general authority conferred on him by the late Colonial Minister, the opening of nineteen new ports in the Archipelago to foreign trade on the 31st May, 1859. This measure, according to our Minister at the Hague, created considerable excitement at the time, as it was apprehended that it would not be practicable to provide a staff of Custom-house officers for those ports, competent to distinguish between goods of Netherland origin and those of foreign manufacture, and thus that quantities of the latter might be introduced to the prejudice of Netherland industry. To obviate this, the present Dutch Colonial Minister instructed the Governor-general to issue a declaration—that the importation of cottons and woollens manufactured to the west of the Cape of Good Hope, would not be permitted in the ports in question. This instruction was followed by another, limiting the number of ports to be opened to foreign trade in general to six, namely, Cheribon, Passœroean, and Tjilatjap, in Java; Natal and Priaman on the west coast of Sumatra and Sumpit, in Borneo, in which the importation of cotton and woollen goods, as above described, has been permitted since Dec. 31, 1859. The area of the islands of Java and Madura has been computed to be 51,336 square miles.

Batavia, the capital of the Dutch settlements, is a seaport, with a population of 259,000, situated on the north-west corner of Java. The public buildings, and many of the private erections are splendid. A considerable amount of trade is carried on here with all parts of the Eastern Archipelago.

Samarang, a place of considerable population, situated on the north coast about the centre of the island, ranks next in importance to Batavia, from which it is distant 361 miles. It is the entrepôt of all the commerce of the interior provinces lying around it, which embrace the richest and most populous parts. Surabaya, another large town, with a population of 82,000, is situated on the north-east coast, near the Madura Strait.

The duties and dues levied in Java, brought in 1854, £660,660. The merchandise imported in that year was to the value of £2,823,112, and the specie £535,905. The exports were merchandise value £5,688,378, and specie £382,085. The tobacco raised in the two years, 1853-54, averaged 2,500,000 lbs.

In 1858, the value of the external trade amounted to £14,747,414, or £2,258,538 more than that at Singapore, but was less than that of the whole Straits Settlements by £1,682,738. The chief articles of produce were indigo, coffee, rattans, rice, spices, sugar, tobacco, and tea. The ships which arrived in 1858 amounted altogether to 2,882, with a tonnage of 222,900 lasts, or 445,800 tons. The number of ships which left Java and Madura in 1858, was 3,344, with a tonnage of 237,776 lasts, or 475,552 tons.

The following figures show the progress of the trade of Java and Madura:—

Years.	Imports, including Specie.	Exports.
	£	£
1842	2,173,433	4,865,291
1843	1,879,282	4,916,069
1844	2,111,862	5,840,470
1845	2,257,650	5,491,264
1846	2,282,209	4,846,482
1847	1,973,264	4,953,765
1848	1,757,509	4,374,005
1849	2,008,224	5,025,526
1850	2,033,499	4,804,741
1851	2,543,533	6,032,654
1852	2,626,298	4,805,569
1853	2,665,409	5,862,980
1854	3,359,017	6,070,463

There are in Java about 320,000 horses and 2,200,000 horned cattle.

The quantity of produce raised in the island of Java in 1851 and 1855 was as follows:—

	1851.	1855.
Coffee, cwts.	1,387,572	1,516,602
Sugar, cwts.	1,524,958	1,484,726
Indigo, lbs.	954,325	803,532
Tea, lbs.	1,023,373	1,604,411
Cinnamon, lbs.	211,067	218,088
Cochineal, lbs.	172,885	169,109
Pepper, lbs.	1,022,147	653,871
Tobacco	771,856	3,270

The high price paid for india-rubber in 1853 and 1854 gave an impulse to the collection, the consequence of which has nearly been the extinction in the East of the tree from which the elastic gum is derived. The article is now worth 1s. 4d. per lb., for fair to good, and is in demand. The exports from Java have been as follows:—

	Piculs.	Value.
1851	6,872	148,416
1852	9,287	211,551
1853	15,195	455,928
1854	26,718	985,926
1855	11,621	428,424
1856	5,284	159,125
1857	6,039	234,181
1858 to Nov.	5,826	—

The exports in each of the last-named three years, it will be seen, were less than one-fourth of the exports of 1854. Years, it is said will be required to replace the trees that have been extirpated, and restore the production, which in the meantime may average 5,000 to 6,000 piculs per annum.

Our export trade with Java has been greatly on the increase of late years. In 1840, the whole value of the British goods and manufactures sent to Java and Sumatra, was but £349,521; in 1850, the exports to Java alone were

valued at £507,449, while in 1860 they had risen to £1,413,915.

The value of the Netherlands commerce with its Eastern possessions was, in 1857 and 1858, as follows, in florins:—

florins	1857	1858
Imports from	79,548,838	82,771,477
Exports to	33,574,888	28,950,178

Bali is the next island east of Java, and has a computed area of 1685 square miles. Its population is estimated at 700,000. The trade is more considerable than might have been expected. The exports consist of rice, oil, cotton and cotton fabrics, tobacco, and coffee. The imports are iron and English cotton cloths. The trade is chiefly with Singapore, Java, and recently with our Australian colonies.

Lombok has an area of 1656 square miles. The exports consist of rice, cotton, pulses, horses, and hides. Much of the rice, and of the pulses and hides are sent to China. The imports comprise salt, iron, cutlery, fire-arms, and cotton fabrics. Lombok, with Bali and Java, are the granaries of the Archipelago, being about the only countries which export the necessary article rice. Lombok sends away annually about 16,000 tons, Bali 20,000, and Java 24,000 tons.

Cotton, for which there is now an increased demand, is produced in most of the Indian islands, especially Bali and Lombok, both which islands export considerable quantities in the seed, but never for a European market. With so ready and near a market as China, we are not likely to draw supplies from the Archipelago, but if the culture were extended it might be the means of transferring some of the Indian cotton from China to Europe. The chief fault of the Eastern Archipelago cotton, is, according to Mr. Earl, the extreme tenacity with which the seed adheres to the wool. The staple, however, is excellent, as indeed is evident from the durability of the cloths made from it by the natives.

The next large island in this chain is Sumbawa, whose computed area is 278 square leagues, or somewhat larger than Jamaica. It possesses both active and quiescent volcanos. Sandal and sappan wood are obtained in the forests, where teak is also met with, but for timber it is inaccessible. The island is remarkable for the number and beauty of its small horses, the most esteemed of all the Archipelago, and largely exported to Java.

Passing over Flores, Chandana, and a number of small adjacent islands, which call for no special notice as respects trade and productions, we next reach Timor, where the Dutch have a settlement at Coepang, on the south-west extreme, and the Portuguese at Dilly, near the north-east end (which is computed at 2,740 square miles). The population of the Portuguese settlements here and at Solor, &c., was stated, in 1857, at 918,300 souls.

The expenditure on these islands has been three times the receipts. In the session of 1860 the Portuguese Cortes ratified a treaty with Holland, defining the boundaries of their respective possessions in Timor and the Archipelago, and ceding all rights to the islands situate to the north of Timor,—Floris, Adenara, Solor, Lomblen, Pantar, and Ombai to Holland, upon payment of 200,000 florins.

The area of Timor is about 9,808 geographical square miles. The people subject to the Dutch are estimated at 47,000. There is steam communication between Coepang and Batavia every month, and this would be an advantageous way of continuing our steam communication between Moreton Bay and Sydney. The principal exportable articles are sandal-wood and beeswax. The former, obtained in considerable quantities, is exported to China, and the latter to Java. Large proportions of very fair wheat, yielding good flour, are grown here, and onions are produced in considerable quantities, and shipped to the neighbouring countries. Copper and gold ore are found in the mountains, but the mines are not worked. Rock salt exists in great abundance at Linga, a town about 40 miles east of Dilly, a short distance from the sea-shore, and the prahus touch there for supplies. Pearls and mother-of-pearl shells are found on the south-east coast.

From the nature of the trade it is impossible to give any correct account of the value of our manufactures consumed in Timor, but even 20 years ago Mr. G. Windsor Earl, the present British Resident at Malacca, stated, "Some idea may be formed of the importance of this market when it is taken into consideration that, with the exception of rice, sugar, wines, spirits, and a few other articles imported for the supply of the European settlements, British goods alone are employed to purchase the entire produce of the island, and this must be the case in all Dutch settlements from which we are not excluded." Nothing can more materially tend to prove the value of commercial depots in this part of the world than the fact that before the establishment of our settlement at Singapore, the consumption of British manufactures in Timor was very trifling.

Timor is the most remote of the eastern islands in which textile fabrics are manufactured, the countries beyond producing no other cloths than those of bark. The texture of the cotton cloths manufactured in Timor and the adjacent islands, closely corresponds with those of the Battas of Sumatra, and the Dyaks of Borneo. The manufacture is evidently of great antiquity, and must have been introduced before that of Java, which is of Hindu origin. In some specimens of salendongs or scarfs shown at the Exhibition in 1851, from Timor, Sumatra, and other islands, the cotton and dyes were of native growth, and the silk threads introduced were obtained from China or India.

Rotti, a rocky island, with an area of about 492 square miles, forms a dependency of the Netherland government of Coepang, in Timor. The only articles of export are horses, considered a superior breed, and the sugar made from the lontar-palm (*Borassus flabelliformis*).

The Moluccas Proper are the native country of the clove, and consist of five islets, lying in a chain running north and south on the western side of the large island of Gilolo or Halmahera. They are Ternate, Tidor, Mortier, Makian, and Bachian. With the exception of the last-named, they are mere volcanic cones springing from the sea. Three centuries ago, the yearly produce of cloves was 2,500,000 to 3,500,000 lbs. As a singular instance of the rude state of remote commerce, it may be mentioned that, before the discovery of the passage by the Cape of Good Hope, a pound of cloves cost 30s.; now it can be had for 30 half-pence. The culture of the clove has now been transferred to Amboyna and Sumatra and the islands in the Straits of Malacca.

Of Bouro, a comparatively large island, little need be said. There is a Dutch establishment on the eastern side, and in 1854 the Netherlands government declared Kayeli a free port. Nearly the whole island is one primeval forest, containing many useful woods, if there were any use to put them to. The only peculiar exportable product of the forest is the Cajeput oil derived from distillation of the leaves of a myrtaceous tree, the *Melaleuca cajeputa*.

Ceram is the largest island of the Malay peninsula, next to Celebes, having a computed area of 4,945 geographical square miles. Like other eastern islands, the forest is here the principal feature.

Lingoa wood from Ceram, the Amboyna wood of commerce, is very durable and capable of a high polish. It was imported in considerable quantities into this country during the period when the Moluccas were British possessions. This wood is abundant at Ceram, New Guinea, and throughout the Molucca seas. It can be obtained in any quantity if the precaution be taken of ordering it during the previous trading season. The Kayu Buka so much esteemed as a fancy wood, is the knarled excrescence of this tree. It is brought to Singapore by the eastern traders from Ceram, Arru, and New Guinea, and is sold by weight. Large circular slabs of the Lingoa wood are obtained by taking advantage of the

spurs which project from the base of the trunk, as the tree itself has not sufficient diameter to furnish very wide slabs. They are occasionally met with as large as 9 feet in diameter, but the usual size is from 4 to 6 feet. A cluster of Islands called Ceramlaut, off the south-east end, are much frequented by the Bugis traders, who obtain rice, and convey to the Western emporia seed-pearls, scented woods, nutmegs, birds of paradise, and a considerable quantity of sulphur.

BANDA owes its chief and almost sole importance to the nutmegs produced there. On Lonthoir, or Great Banda, there were, in 1855, 25 plantations; on the island of Neira 3, and on Ay 6. The produce of the Banda trees has varied very much, owing partly to natural and partly to artificial causes. In the earlier part of last century it was greater than it has been since; the nearest approach to the old figures having been attained in 1847, when the crop amounted to 755,252 lbs. of nuts, and 105,051 lbs. of mace. The average amount produced in the last fifteen years has been about 579,000 lbs. of nutmegs, and 137,000 lbs. of mace.

AMBOYNA owes its importance entirely to the clove plantations; and, being the capital of the Moluccas, the Governor resides here. The people of the villages are obliged each to maintain a certain number of clove trees, and the chiefs are responsible for the trees being kept in order. The produce is sold to the Government at a price so small that, were not forced labour adopted, the natives would abandon the culture. The people live entirely on the bread made from the sago palm.

We now stretch northerly to the PHILIPPINE Archipelago. According to Spanish writers, these islands amount to 408, exclusive of mere rocks and uninhabited islets. Two are pre-eminently large, Luzon, which is by more than one-half, and Mindanao by one-fifth larger than Ireland. Luzon is superior to all the rest put together, and for extent, fertility, and other natural advantages, is probably the finest in the tropical world. The entire Archipelago contains an area of about 200,000 square geographical miles.

The soil of the Philippines is exceedingly rich, and the commercial products of plantain-hemp, tobacco, sugar, indigo, coffee, sapan-wood, rice, and cacoa, are very extensively cultivated in some of the provinces, and susceptible of being so distributed among all the others.

Through this group is spread a population of from 3,500,000 to 4,000,000 of inhabitants who are Christianized, and with the exception of a few mountain and petty tribes and the Mahometans in Mindanao, live in peaceful subordination to the official agencies of the Government.

In the Island of Panay, which is below the 12th degree of latitude, and generally described by the name of its chief province Iloilo, the population is 559,861. The adjacent islands, Leyte and Samar, contain unitedly, nearly 300,000, and in Luzon the population is little short of 2,000,000.

From Pangasninan in the north is drawn a principal part of the sugar sent to England, and to Europe; and from thence, and from Ilocas, the indigo which is exported; in Zebu, Iloilo, and the southern islands, is produced the sugar which chiefly supplies Australia; besides hemp, buffalo hides, and horns, tortoise-shell, bees-wax and sandal wood, for the markets of Europe and the United States; and from the rich provinces which crescent Manila, the same productions are sent for export through the capital, while, independent of foreign trade, the northern division, as the granary of the Philippines, and of China in its seasons of dearth, and Pangasninan as the chief ship-building province of the Philippines; and Iloilo, and the south, as manufacturing districts, of webs of much value, and articles of extensive native consumption, have resources of local trade which enrich and animate their industry.

By a notice from the Foreign Office at Madrid, dated 2nd July, 1860, the only ports open for trade hire are Manila, Sual, Iloilo and Zamboangan. No direct traffic under a foreign flag is permitted with Jolo and adjacent isles, which, in conformity with the capitulation of 30th April, 1851, form part and parcel of the Philippine Archipelago.

The staple product of Philippine agriculture is rice. Next to it may be ranked maize, of which two crops are yearly produced, the variety usually in cultivation coming to maturity in nine weeks. Then follow pulses, the abaca, banana, cotton, sesame, sugar cane, coffee, and cacao; with the coco, areca, and gomuti palms, and most of the fruits of the Malay Archipelago.

No fewer than 218 forest trees, chiefly of the more northern provinces, have been subjected to experiments in the arsenal of Manila, and the relative strength, tenacity, and specific gravity of the timber ascertained for economic uses. For ship-building, the following six are most in use, the Molave (*Vitex geniculata* or *V. pubescens*) the Banaba, the Jacal, the Dungon (a *Sterculia*), the Mangachapiu (*Vatiera mangachapui*), and the Quitaquita. Of the timber of these, large ships have been built, stated to have lasted forty years, which would place them on a level with teak or oak, a fact that could not be asserted of any of the woods of the islands of the Malay Archipelago. Teak is found in the island of Mindanao, at the distance of 1,300 geographical miles from Java and Sumbawa, the only other islands of the Archipelago that yield it. It grows, however, on the parts of Mindanao under native occupation, and is, therefore, not available for European uses.

The metals ascertained to exist in the Philippines are gold, found in most of the larger islands, but most abundant in Luzon and Mindanao; iron, chiefly in the same islands, with copper, lead, and mercury in Luzon. Sulphur is abundant in most of the islands, but especially in Leyte, Mindanao, and the province of Albay, in Luzon. Coal, a lignite, has been found and partially worked in the islet of Rapu-rapu, on the eastern coast of Luzon, at the entrance of the great bay of Albay, and the two small islands at the southern extremity of Mindanao, called Serangani, are stated to be nothing but coal-beds, not improbably part of the same Borneon field which crops out at Labuan, and is now worked by an English company.

The article termed in commerce Manila hemp, which is, however, the fibres of a plantain stem, is now so important an article of commerce, and affords so excellent an example for following out in other quarters, that I shall dwell somewhat upon the manufacture. It is by no means a new industry. The celebrated circumnavigator, Dampier, notices the process, more than a century ago, as follows:—"They take the body of the tree, clear it of its outward bark and leaves, cut it into four quarters, which, put into the sun, the moisture exhales; they then take hold of the threads at the end, and draw them out; they are as big as brown thread: of this they make cloth in Mindanao, called *saggen*, which is stubborn when new, wears out soon, and when wet is slimy." The natives of the Philippine islands give the name *abaca* to the vegetable fibres of an indigenous species of the plantain, *Musa textilis*, of which they make their cordage; and of which they have considerable manufactories. In 1831, the whole export of Manila hemp (so called) from the Philippines did not amount to more than 346 tons; in 1837, it had reached 3,585 tons; and during 1856, no less than 22,000 tons left Manila for the United States and Europe. This plantain was formerly believed to be found only on Mindanao, but this is not the case, for it is cultivated on the south part of Luzon, and all the islands south of it. It is not found, however, growing in the Philippines north of lat. 14° N. It grows on high ground, in rich soil, and is propagated by seeds. The plant attains the height of fifteen or twenty feet. The usual mode of preparing the hemp is to cut off the stem near the ground, before the time, or just when the fruit is ripe. The stem is then eight or ten feet long below the leaves, where it is again cut. The outer coating of the herbaceous stem is then stripped off, until the fibres or cellular parts are seen, when it under-

goes the process of rotting, and after being well dried in houses and sheds, is prepared for market by assorting it, a task which is performed by the women and children. That which is intended for cloth is soaked for an hour or two in weak lime-water, prepared from sea-shells, again dried, and put up in bundles. From all the districts in which it grows it is sent to Manila, which is the only port whence it can legally be exported. It arrives in large bundles, and is packed there, by means of a screw-press, in compact bales for shipping, secured by rattan, each weighing two piculs (or 266 lbs.) The best description ought to be white, dry, and of a long and fine fibre. This is known at Manila by the name of *lupis*, the second quality they call *bandala*.

The exportation has much increased within the last few years, in consequence of the demand for it in the United States and Europe; and the chief part of the crop is now monopolised by the two American houses of Sturges and Co. and T. N. Peak and Co., of Manila, who buy all of good quality that comes to market. This is divided between the two houses, and the price they pay is from four to five dollars the picul.

In May, 1842, an American, named O'Keating, established himself at the village of Nactagan, in the environs of Manila, and commenced the manufacture of cables and cordage from the Abaca, upon the most improved system in use in England and America. After having passed several years at Manila, and collected all the information necessary for the execution of his project, Mr. O'Keating returned to the United States in order to procure the necessary apparatus and machinery. He took with him from Boston a high pressure steam-engine of 30 horse-power, with the requisites for dressing the hemp and converting it into rope. His factory is situated on the banks of the Passia. The first floor is occupied with the dressing machines, three of which are cylinders of wood, covered with points of iron of about two inches in length, distant from each other about 1½ inches. These first open the fibre of the hemp, which then passes to another machine, under a cylinder of much larger diameter, of which the points (cards) are much smaller, and placed together. By these the fibres of the hemp are separated into a much finer thread, and divested of the woody or useless particles. After this preparation the hemp passes between two iron cylinders, which compresses it very strongly. From thence it is conducted to a smaller machine, which gives the first twist, and winds it on a bobbin of about six inches diameter. The dimensions of the cord are increased or diminished by means of an iron screw, which adjusts the diameter to the hole (through which the fibres pass) to the required size.

The ropery is a building 800 feet in length, built entirely of American timber, with a shed at each extremity. In the one farthest from the house is the rack upon which the bobbins are ranged. Eight or ten bobbins of hemp suffice to make a cable of a large size. Twelve or fifteen may be made at a time. The strings of the bobbins pass through round holes, pierced in a plate of brass, having an octagonal form fixed on another rack (*ratelier*) perpendicular to the line of the ropery. The mass of strings or strands are united together by an iron hook, which is fixed on a carriage with a double catch, drawn by the steam-engine on a railway.

The article produced is very superior to that made by hand, and in strength and durability there is no comparison between these two articles. By this machinery the hemp is better cleaned of its woody and useless parts, which, whilst it improves the cordage, considerably increases the cost, from the greater loss of material in this process. The steam cordage sells at 8 dollars per picul, while the ordinary kind fetches only 6½. About 16 piculs can be produced daily. The cost of the raw material is four dollars per picul. Nearly 40 natives are employed, whose average daily pay is about 14d. The fuel used for the engine is wood, which costs about 1½ dollar the talaxan (about 73 cubic feet). These comparative prices refer to a few years ago, and may have undergone change since then.

The highest degree of skill is displayed in the manufacture of textile fabrics in the Philippines, the raw materials being cotton, the fibres of the abaca (*Musa textilis*), banana, and pine-apple leaf, all of them domestic products, with silk imported from China. The manufacturers are women, and, as in all other Asiatic countries, the manufactures are entirely domestic. They extend all over the islands, but are more especially determined towards the provinces of which the raw materials are the staple products. Thus, in Ilocos, which is remarkable for the growth and export of cotton, there are supposed to be no fewer than 20,000 looms. Camarines and Albay, in Luzon, and Iloilo, in Panay, are the chief centres of production of the abaca, or Manila hemp, and there, also, are the principal manufacturers of it. Manufactories of cotton and abaca, as also of the pina, or fibre of the leaf of the pine-apple, are carried on in the metropolitan province of Tondo. From the extraordinary facility with which the pine-apple is grown in the vicinity of the equator, it seems almost certain that, by the application of European skill to the process of separating the fibre from the pulpy matter of the leaf, a valuable raw material composed of it might be obtained for the manufactories of Europe. The cloth made from the pine apple fibre, by the industry of the Philippines, is well known to be of great strength, durability, and beauty. The production of fruit and leaves in no manner, it should be remembered, interfere with each other, the leaves being fittest for fibre after the fruit has ripened, the reverse of what is the case with the poppy, which cannot produce both opium and oil; the coco palm, which will not yield both sap and fruit, and the plantain, which must be cut down for its fibre. From the pine-apple fibre in Manila are produced fabrics which are as great curiosities as the muslins of Dacca or the shawls of Cashmere. A single dress of pina, suitably embroidered, has sometimes been sold for the enormous sum of £325.

The art of dyeing is but very imperfectly understood. The materials are vegetable products, such as the sibucao, or sappan wood, and the colours produced are neither bright nor permanent. The art of calico printing is unknown, as it is, indeed, to all the Asiatics except the Hindoos. The extent to which textile manufactures are carried on may be judged by the fact that with but a small exception for foreign fabrics, nearly 5 millions of people are clothed with them, and that there is even some considerable exportation.

The art of mat-making is carried on to much perfection by the islanders, the raw material being sago, palm leaf, and rattan. Sago mat bags for packing, to the number of 156,000, were shipped to Manila from Capiz, in 1856. Sagaran and Guimaras coarse Manila hemp-matting, are largely used at the Government factories in Manila, for packing the leaf tobacco forwarded to Spain.

At several places in Luzon, in Cebue, &c., the natives make a species of cloth from the plantain tree, known by the names of "Medrinaque" and "Guiara" cloths. The former description is in the greatest consumption, being stouter and more valuable than the other sort, and is mostly all bought up by the natives themselves, although a small portion of it is also exported. The bulk of all the Medrinaque exported goes to the United States, to the extent of about 30,000 pieces annually, and sometimes as much as double that quantity is sent. In 1850 a large quantity was sent to Europe, a novel feature of the trade in the article.

In the shape of hats, cigar cases, and the like, there is even a considerable exportation, besides a large domestic consumption of articles of this description. The highest degree of mechanical skill is probably exhibited in the manufacture of gold trinkets, consisting of works in filagree and necklaces; some of the last, under the name of "bejuguillos," are even highly appreciated in foreign countries. The goldsmiths, equally with the weavers, are women. The art of manufacturing a coarse, un-

glazed domestic pottery, has been immemorially practised, but all the earthenware of any value is brought from China. The manufacture of malleable iron is very imperfectly understood, and the iron of inferior quality, and hence the chief consumption is furnished from Europe.

PANAY is the largest of the Philippine islands after Mindanao, and the most fertile and densely peopled of that Archipelago. In 1850 it contained a population of 566,957, equal to 145 inhabitants to the square mile. The soil well irrigated by abundant mountain streams, is eminently fertile, its staple products being rice, sugar-cane, cotton, coffee, tobacco, pepper, and cacoa. Its forests yield ebony and sapan wood, and its shores and rivers abound in fish, including the mother-of-pearl oysters, the tripang and tortoise. The island is divided into three provinces called Capiz, Iloilo, and Antique. Capiz is the most productive in rice of all the Philippine provinces, the seed, according to some Spanish writers, returning from 150 to 200.

Although the cultivation of sugar in Panay as an article of export is comparatively recent, in 1856, 12,000 piculs went forward from Iloilo to Manila, of which about 3,000 were brought over from the Isle of Negros. In 1857, so great was the stimulus given by enhanced prices, that about 25,000 piculs, or nearly 1,600 tons were shipped, and since then there has been a further large increase, owing to the rapid extension of cane planting. The island of Negros produces about 1,000 tons, and the contiguous island of Zebu 6,000 tons. The very defective nature of the process employed by the native and "mestizo" planters, does not allow of the production in Iloilo of a superior class of sugar, and all that leaves for Manila may be described as "ordinary brown unclayed," but the grain is usually very good, and on undergoing the ulterior process in England and Australia, it yields a fine strong sugar, and has been much approved of for boiling purposes at the Glasgow refineries.

Were a better system of crushing and boiling introduced, sugar of an excellent quality might be produced, and it is greatly to be desired that a few Europeans, with sufficient capital and experience, would form estates in the neighbourhood. At present there is not a single iron sugar-mill in the island. The unclayed sugars of the Philippines, in ordinary times, even with the present defective, and consequently expensive, mode of manufacture, are held to be the cheapest in the world.

Sappan wood is exported in considerable quantity from the province of Iloilo. It is chiefly produced in the vicinity of the southern coasting towns, Giumbal, Nuagao, and San Joaquin (the farthest within 20 miles of Iloilo), from whence the greater part is brought round by sea, for shipment to Manila. In 1856, about 2,100 tons were shipped to Manila, and 49 tons from Antique. The high prices lately obtainable at Manila led to the formation of new plantations, which will further increase the exportable amount. The large quantity of this dyewood shipped (mostly to Europe and the United States) from Manila, is generally taken at comparatively low freight, in lieu of dunnage, but a considerable portion both of straightwood and roots (the latter of which are used in China and at Calcutta), is sent on yearly to Singapore and Amoy, and forms the bulk of cargoes of such vessels as load at Manila for the former port. The quality of the Iloilo sappanwood would be much better were the natives to abstain from the practice of cutting down a large proportion before the trees are sufficiently grown. When allowed to attain its proper development, it is said to be equal or superior to that of Misamis and Bolinar, at present the best qualities brought to the Manila market. As both settlers and natives endeavour to deliver the wood as soon as practicable after it is cut, the loss in weight on the short voyage to Manila is said to be sometimes as much as 12 or 14 per cent.

The production of tobacco, throughout the world, is now enormous, the consumption in Europe alone being about 460,000,000 lbs. The quantity produced in Java and the Philippines is on an average 4,000,000 lbs.

The tobacco shipped from Iloilo is classed into five qualities, the rates given by the factory for which are respectively 6¾ dollars, 5¼ dollars, 3 dollars, and 2 dollars, 87½ cents, per quintal, respectively. The seedlings are planted out in January, and the greater part of the crop comes forward in May and June. The soil of the major part of the Bisaya Islands is favourable to the growth of tobacco. The Island of Negros formerly produced about 8,000 quintals of very good quality, which the Iloilo traders, through their agents, were in the habit of purchasing from the independent tribes inhabiting the interior. Zebu produces about 3,000 to 5,000 quintals for export, of rather inferior quality. At Leyte, particularly in the district of Mosain, tobacco of very excellent quality and colour is grown, but it does not pay to produce in large quantities for sale to the factories at Manila, and is consequently used almost exclusively in the Bisayas, where it is much appreciated. Samar also grows tobacco for local consumption. The manufacture of cigars is allowed throughout the Bisayas, but not for sale at Manila or elsewhere. For the present, the export of tobacco from Panay and the other islands possesses little direct interest for British and other foreign merchants, for whom the transactions with the Government, as at present conducted, are not of a desirable or suitable nature. The British Vice-Consul considers that if the existing monopoly of tobacco were abolished (substituted by a system of farming out lands, a direct tax on the quantity under cultivation, or an export duty), and both the free manufacture for, and direct shipment to, foreign markets allowed, the export from Panay would immediately become of great importance to the foreign trade. The soil of the greater portion of the island being well adapted for the cultivation of the plant, the export, under the stimulus of much higher prices, and the consequent employment of more and better directed capital, would be capable of great expansion, particularly if, as would in all probability be the case, the culture were undertaken by Europeans, and the present system, of small patches cultivated by natives, gave place to estates on a large scale, as in Cuba. The subject of the suppression of the existing monopoly is a most important one for the Philippines, and especially so for Panay, where the cultivation of the tobacco plant has already reached a considerable degree of development.

At Pangasinan, according to the report of our Vice-Consul at Sual, the articles of trade are rice, 600,000 to 700,000 cavans annually, which ranges from 1½ dollars to 2½ dollars per cavan, according to the season; paddy, 4 to 12 sheaves for a dollar; sugar, 100,000 to 150,000 pilones, fluctuating between 1 dollar and 3¼ dollars per pilone or pot, of more than 75 lbs. Indigo, 200 quintals, 34 to 52 dollars; mastic, 1¼ to 1½ dollars per quintal, according to quality; sappan wood, 1 to 2½ dollars per pesado of 7 arrobas (175 lbs.). Rattans entire, from 3 to 4½ dollars per thousand, cut in parcels 37½ cents. per thousand; coco-nuts, 1 to 1¾ dollars per hundred, straw hats according to quality 37½ dollars to 75 dollars per hundred; cow and buffalo hides, and pigs are also articles of trade. Large numbers of bullocks are also sent by land to Manila from Sual and the district of Bolinao at a price of 6 to 8 dollars, small and large together.

The system of collecting merchandise and produce through brokers (*personeros*), in all the Philippine islands, is subject to many grave inconveniences. Advances, always in silver, are made to them to purchase. Between the exporting merchant and the native grower there are so many intermediate hands that neither one nor the other can obtain the profits he is entitled to. Collecting merchandise by commission has, however, become there an easy and commodious occupation, in which thousands of men are engaged, who by their number, and the requisite remunerations to them for their intervention, seriously affect commercial values and facilities in every respect. The most experienced persons in the country, while they are sensible of the evils of this system, consider it necessary and irremediable, owing to the distances from one

place to another, the habits of the natives, and the qualities of the productions themselves.

Considering the great advantages which would accrue from the establishment of lines of small merchant steamers between the islands, the fact that the local Government has lately given orders to commence working the extensive coal districts existing at Zeba is not without importance. The subject of steam communication for the Archipelago is attracting attention at Manila, and it is not improbable that in a few years the islands will be connected in this way in a manner which will greatly tend to their advantage.

New Guinea is conjectured to have an area of 200,000 square miles. It is only separated from North Australia by a sea of 80 miles broad. Our knowledge of this island is meagre in the extreme, but judging from all that has been ascertained regarding the neighbouring islands of Borneo and Celebes, and from the little that has been reported of New Guinea, it seems probable that the latter bears in its natural features and productions a general resemblance to Borneo. As far as it has been seen, the whole island appears to be one uniform and luxuriant forest, many of the trees of which run up to the height of 150 and 180 feet. The economical use of the timber of these large trees has not been determined. Three commercial plants seem to be found there, the nutmeg, the Massoy, the bark of which is in repute, and the pulasari (*Alyxia stellata*). If the local timber should prove to be of good quality, it is probable that it may come to be in demand in our Australian colonies, when these attain a more dense population.

The sovereignty of this great island was formally claimed for the British Crown in the year 1793, by Captains Bampton and Alt, in the ships *Hormugeer* and *Chesterfield*. The Dutch attempted to form a settlement on its southern coast in 1828, in the bay of Oetenata, which ended in a failure. It required seven weeks time to clear a spot for a small redoubt, and when this was effected the insalubrity of the place was at once developed, though its occupation continued for several years, until necessity compelled its abandonment. Proposals have been made, from time to time, in this country to colonise New Guinea, and to introduce the culture of cotton there, and however glowing the prospects held out may seem on paper, they are based upon insufficient knowledge and chimerical views. The future discovery of mines of silver, gold, copper, or tin, might tempt the settlement of Chinese, but not of Europeans in tropical and forest-clad New Guinea.

The produce of the Arru islands, to the south-west of New Guinea, a group extending about 100 miles from north to south, consists chiefly of pearls, mother-of-pearl shells, tortoise shell, birds of paradise, and trepang, ebony, and kayubuku wood. The Bugis prahus import large quanties of British calicos, iron, hardware, muskets, gunpowder, &c., from Singapore. To obtain these, Dobbe, the town on the island of Warud, is visited by natives of Ceram, Buru, New Guinea, and all the adjacent islands, it being the only spot in that part of the world where British manufactures can be procured. Of the timber of the Arru Islands there are several varieties highly spoken of for durability, and the ease with which it is worked. Although of immense size, the trees are almost invariably sound, and as they can be felled within a few yards of the beach, it is not impossible that timber may at some future time form a valuable article of export.

The Ki group, sixty miles distant from Arru, consists of two large islands, with a population of about 10,000. The commerce here is inconsiderable, when compared with that of the Arrus. But prahus from Celebes, Buton, and Banda come here to obtain tortoiseshell, Indian corn, and cocoa nut oil. The last is the staple produce of the group, and is of superior quality. A large portion of the prahus navigating these seas are built here. The small boats especially are highly prized for their durability and swiftness, and it is singular that these people have hit upon a model closely resembling that adopted for fast-sailing vessels in England.

I quite agree in the observations thrown out on a late occasion here by Mr. Crawfurd, that state policy demands the establishment of a British settlement on the north coast of Australia, and a naval station there which might, as from a centre, radiate to India, China, the Oceanic Islands, and the British Possessions in Australia, at once to remove the lawless and predatory hordes infesting the islands of the Archipelago, and to command and protect the commerce of the Straits, and of the existing Australian Colonies.

From the opinions I have heard of the locality, from my brother-in-law, the late Capt. Timpson, R.N., who was for some time officially resident there, I do not think, however, Port Essington should be the spot—for that Government settlement turned out a failure. Cape York, or some part of the Gulf of Carpentaria, would form probably a more suitable locality, and our knowledge of the surrounding country, and of the interior, has, of late years, been greatly extended.

The survey we have thus taken of this important field of commerce, superficial as it has necessarily been, will serve to convey an idea of its present extent and future prospects. The extension of trade, of British influence, and of steam communication, will do much to promote civilisation, and to suppress piracy.

PRINCIPAL SPECIMENS EXHIBITED.

Gums, Resins, &c.

Singapore Dammar	Singapore.
Black Dammar	Malacca.
Dammar Batu (Shorea robusta)	Malacca.
Dammar	Malacca.
White Dammar (Chloroxylon dupada)	West Coast of Sumatra.
Resin of ,, (Chloroxylon dupada)	Sumatra.
Gaju gum (Anacardium occidentale)	Celebes.
Gutta kandis (kind of gamboge)	Borneo.
Getah kawhe (ditto)	Java.
Manilla mastic	Philippines.
Heraduccan (A kind of Dragon's blood)	Sumatra.
Dragon's blood	
Gutta percha or Taban	Borneo, &c.
Caoutchouc	Borneo & Java.
Gamboge	Sarawak.
Benzoin (Styrax benzoin)	Sumatra.
Wood oil	Singapore.
Dammar oil (Dammara orientalis)	
Camphor oil (Dryobalanops camphora)	Borneo and Sumatra.
Camphor (Dryobalanops camphora)	Ditto.
Cajeput oil (Melaleuca cajeputi)	Bouro.
Borneo dammar	Borneo.

Oils and Oil Seeds.

Katjang tanah (Arachis hypogœa)	E. Archipelago.
Borneo tallow nuts (Dipterocarpus sp.)	Borneo.
Borneo vegetable tallow ,,	Borneo.
Nutmeg butter (Myristica moschata)	Moluccas.
Candle nuts (Aleurites moluccensis)	

Dye Stuffs, &c.

Sappan wood (Cæsalpinia sappan)	Philippines.
Sappan root (Cæsalpinia sappan)	
Yellow dye wood (Cæsalpinia pulicata)	
Yellow dye wood (Cæsalpinia sp.)	
Kayu Kudrang	Malacca.
Bunchong Balu	Celebes.
Lakah wood	Archipelago.
Lopisip bark	Celebes.
Mangrove bark (Rhizophora mangle)	Singapore.
Samak bark	Singapore.
Sogah bark	Singapore.
Mungkudu (Morinda umbellata)	Java & Celebes.
Turmeric (Curcuma longa)	Java.

Olen or Mishmee (Coptis sp.?)	Batavia.
Java indigo (Indigofera sp.)	Java.
Manila indigo (Indigofera sp.)	Manila.
Gambier (Uncaria gambir)	Singapore.
Catechu (Acacia catechu)	Singapore.

SPICES, CONDIMENTS, &c.

Sumatra black pepper (Piper nigrum)	Sumatra.
Java black pepper (Piper nigrum)	Java.
Singapore white and black pepper (Piper nigrum)	Singapore.
Black pepper (Piper nigrum)	Batavia.
Long pepper (Chavica officinarum)	Surrabaya.
Nutmegs (Myristica moschata)	Moluccas.
Wild nutmegs Myristica sp.) 2 varieties.	Batavia.
Wild nutmegs (Myristica sp.)	Malacca.
Mace (Myristica sp.)	Malacca.
Cassia buds (Cinnamomum cassia).	
Cassia vera (Cinnamomum cassia).	Batavia.
Clove stalks (Caryophyllum aromaticum).	
Cloves (Caryophyllum aromaticum)	Amboyna.
Clove bark	Borneo.

FOOD PRODUCTS.

Ejin (a kind of grain)	Malacca.
Rice (Oryza sativa)	Java.
Ketane rice (Oryza sativa)	Malacca.
Sago pith	
Sago cakes	Ceram.
Brown sago	Borneo.
Granulated sago	Borneo.
Pearl sago	Borneo.
Sago flour	Borneo.
Fine Borneo sago	Borneo.
Arrow root	Singapore.
Tapioca	Singapore.
Tapioca sago	Singapore.
Kedaoong (a kind of pulse)	Java.
Kakara (ditto)	Java.
Kojang Botor (ditto)	Java.
Java Imperial tea (Thea bohea, &c.)	Java.
Java Young Hyson (Thea bohea)	Java.
Java coffee (Coffea arabica)	Java.
Timor coffee (Coffea arabica)	Timor Island.
Singapore Coffee (Coffea arabica)	Singapore.
Cane sugar (Saccharum officinarum)	Java.
Palm sugar (Arenga saccharifera)	Java.
Nipa sugar (Nipa fruticans)	
Toddy or arrack	
Agaragar (Sphaerococus spinosus) 3 var.	Malacca.
Edible Alga (Laminaria saccharina)	
Ditto (Gelidium corneum)	
Ditto (Plocaria candida)	
Blendju (Fried with oil).	Java.
Kanari (Canarium commune)	Java.
Tamarinds (Tamarindus Indica)	Malacca.

FIBRES, &c.

Cotton (Gossypium sp.) 2 varieties	Sumatra.
Cotton (Gossypium sp.)	Celebes, Java, and Borneo.
Bark Cloth	Borneo.
Ditto (Broussonetia papyrifera)	New Guinea.
Pine apple fibre (Ananassa sativa)	Singapore.
Rhea fibre (Boehmeria nivea)	Java.
Pina muslin (Bromelia pigna).	Philippines.
Plantain stem fibre (Musa paradisiaca)	Mindanao.
Manila hemp (Musa textilis)	Philippines.
Ejou fibre (Arenga saccharifera)	
Fibre of Bœhmeria candicans	Java.
Agava fibre	
Malacca cane (Calamus scipionum)	
Rattans (Calamus sp.)	Banjermassen.
Bamboo (Bambusa arundinacea)	

WOODS.

Kayu garu (or Lign aloes)	Borneo.
Kayu buka	Cesam.
Sandal wood	Timor.
Teak	
Ebony	Borneo.

DRUGS, &c.

Cubebs (Piper cubeba)	Java.
Pakoe kidang (Balantium chrysotrichum)	Java.
Betel nuts (Areca catechu)	Sumatra.
Ignatius Beans (Ignatia amara)	Philippines.
Nux vomica (Strychnos nux vomica)	Ind. Archipelago
Tjinkok	Java.
Tjeko	Java.
Djamoer bomoo (a fungus)	Java.
Tobacco (Nicotiana rustica)	Java & Manila.

ANIMAL PRODUCTS.

Trepang (Holothuria sp.)	Three varieties.
Dried cuttle fish	
Dried molluscs	
Edible birds' nests	Java.
Mother-of-pearl shells	Manila.
Pearls	Sulu.
Tortoise shell	Manila.
Birds of Paradise	New Guinea.
Beeswax	Borneo.

MINERAL PRODUCTS.

Antimony (Sulphuret)	Borneo.
,, (Oxide)	Borneo.
Coals	Borneo.
Sulphur	Labuan.
Iron	Borneo.
Tin	Borneo, &c.
Quicksilver	Borneo.

CLOTHING, IMPLEMENTS, &c.

Sumpitan, with war-spear, as used by the Kyans.
Umbrella Shield of Kyan Chief, ornamented with human hair tufts.
Female's large hat, worn to keep off the sun.
Man's cap.
Models of Pirate Vessel and Native Boats.

Among those to whom I acknowledge myself indebted are, to the Royal Geographical Society, and Mr. E. Stanford, for maps and diagrams; to the Borneo Company, for specimens of Borneo produce; to Dr. Forbes Watson, of the East India Museum, for various samples of Straits and Eastern produce; to Dr. Macgowan, for Dyak weapons and articles of dress; to Messrs. Noble, for fibres; and to M. C. Cooke, Esq., for various interesting illustrations. These, with the numerous specimens from my own private collection, have enabled me to present to the meeting a large and varied display of almost all the principal productions of the Archipelago.

DISCUSSION.

The CHAIRMAN would now invite discussion upon Mr. Simmonds' paper—in his (the Chairman's) opinion a very able one, mastering so many details, and exhibiting an amount of information enough to make those who, like himself, thought they were pretty well acquainted with the subject, quite jealous. There were many gentlemen present who were competent to address the meeting upon this subject—some who were probably better acquainted with the subject than he was, although he had bestowed nearly fifty years' attention upon it.

Dr. MACGOWAN remarked that Mr. Simmonds had certainly not overrated the productive capacity of this extensive range of islands. There had been a very remarkable change in the commercial intercourse between these islands and China since the Chairman was in Singapore as its governor, particularly in this respect, that the en-

tire trade was formerly carried on in those huge junks with which the Chairman was familiar in his earlier days, but these were now to a great extent replaced by square-rigged vessels, owned by Chinese merchants, manned by Malay crews, and commanded for the most part by English officers. But for this Amoy and Ningpo would be but insignificant places for trade. He should be glad to have from the Chairman some information with regard to the disease to which the spice trees appeared to be subject, when the attempt had been made to introduce them into fresh localities. It had been said that they did not long survive removal from their native districts. As President of the Ethnological Society, probably Mr. Crawfurd could be able to give them some information relative to the Malay population—whether they were melting away before the Chinese population, as the American Indians had done before the white races?

The Hon. WILLIAM NAPIER could bear testimony to what Dr. MacGowan had just stated with respect to the different character of the vessels now engaged in the trade between China and Singapore, although that gentleman was in error in supposing that the junks had entirely disappeared. That class of vessel was still largely employed at Macao, Amoy, and other ports, in carrying enormous numbers of Chinese emigrants and the chow-chow cargoes, as they were called, to Singapore. At the same time, no doubt the most important portion of the trade was carried on in vessels commanded by British officers, and owned for the most part by resident native merchants. But there was one observation in the paper which particularly struck him, and which had chiefly induced him to rise, viz., that which referred to piracy in the Eastern Archipelago. It was stated that fleets of piratical proahs were fitted out annually from Johore. He should be sorry to see a misapprehension of that kind go forth to the public with reference to a sovereign who was an intimate ally of the British Crown, so much so that his excise farms were sold every year in conjunction with those of the British Government. The sovereign of Johore was, he believed, particularly well known to their distinguished chairman. His father was one of the princes with whom Mr. Crawfurd negociated the treaty for the final cession of Singapore to the British Government, and he was succeeded by his son in the year 1856, now the sovereign prince of Johore. It would be a pity that such a statement as that piratical fleets were fitted out from that state should go forth to the world, as nothing could be farther from the fact. He might add that the sovereign of Johore had been presented with a sword by the Governor-General of India for his aid in the suppression of piracy. The fact was that, at the present moment, the hordes of pirates infesting the Archipelago were not Malays, but principally Chinese.

Mr. MILES rose with the intention of asking for information rather than in the hope of communicating anything of interest upon this subject. He had been much interested by a statement he had seen relative to the course which it was alleged the Dutch merchants had pursued with reference to the products of some of the Spice Islands. He had seen it stated by British travellers in the Moluccas, that the Dutch, about the year 1780, destroyed the clove trees in all those islands except upon one, in order that they might secure a monopoly in that particular spice. He should be glad to be informed whether the clove trade was entirely monopolised by that people, and whether the present supply was obtained from that one island which was exempted from the alleged destruction of the trees. He would also ask whether the distribution of the cocoa tree had been carried on to any extent in the islands of the South Sea by officers of the British navy, as had been suggested by Captain Flinders. It was quite true that whenever persons planted under such circumstances, others reaped the fruits; but they all knew the great use of the cocoa-nut, and if it were planted in those barren islands, it would prove of great value to subsequent voyagers.

Mr. W. S. MANNING, as the representative of Messrs. G. and J. A. Noble, a firm who had long been devoted to the flax and hemp trade, desired to make a few remarks. The subject was a very comprehensive one, so much so that much of interest and importance was of necessity passed by. In the matter of fibres, perhaps Mr. Simmonds had hardly done justice to their importance. Whilst devoting a somewhat lengthened description to the Ejoo fibre, which, although adapted to native, was probably hardly suited to European requirements, they had not heard of that "Prince of Palms," the cocoa-nut, which to some of the Asiatic Islanders was much more literally "the staff of life," than wheat was with us. The products of the Ejoo palm were positively not known in this country as an article of commerce, whilst from the latter, the *Cocos nucifera* or *Palma indica major*, of Rumphius, we received from 6,000 to 7,000 tons, in coir, yarn, fibre, rope, &c. Our supply at present was derived entirely from Ceylon, Cochin, and the adjacent islands—the Maldives and Laccadives. It luxuriated, however, on the shores of many of the islands of the Eastern Archipelago. The gentleman who had just sat down very aptly remarked that more attention should be paid to the propagation of the cocoa-nut tree, saying that too often "what was everybody's business was nobody's." Nature, however, had arranged for the distribution of this most useful palm. Wafted by wind and wave, the fallen kernel floated to distant shores, perhaps not inhabited by man, and throve most luxuriantly wherever it found a foot of soil. An enumeration of all the native requirements satisfied by this palm, it would be impossible to give; but baskets, combs, candles, cups, ladles, spoons, boats, sugar, yeast, vinegar, cabbage, milk, tiles, toddy, charcoal, torches, brooms, mats, and sails, were amongst them, besides copprah, or the compressed fruit, which, in addition to the immense native consumption, was largely exported to Indian ports. There were 1,491 tons of copprah shipped from Cochin alone, between 1st August, 1860, and 31st January, 1861. Cocoa nut oil was also a valuable product. Mr. Simmonds had spoken of Manila hemp, and the increase of the exports; if he had followed it to the latest advices, the extension was still more important. In 1856 the total shipments, as Mr. Simmonds stated, exceeded 22,000 tons; in 1859 they amounted to 26,625 tons, and last year they were 24,306 tons. The exports up to the 8th March this year reached 8,182 tons (of which there came to Great Britain, 4,271 tons), which, if continued in the same ratio, would give a total of almost 50,000 tons for the year. Prices had been during the last two years more than 25 per cent. lower than the average of the previous ten years. It appeared that the producers were greatly increasing the supply without an increase, but in the face of a heavy decline, in prices. Manila hemp was now very considerably the cheapest and best of rope making materials. Machine made Manila rope had been proved to bear upwards of 59 per cent. more than the Government test applied to Russian hemp rope. It was, besides, 25 per cent lighter. The Admiralty at present took nothing but Russian hemp, for which they had perhaps an unusual partiality. With the above striking advantages, and a copious supply, the authorities would perhaps take a step in the right direction by allowing an Eastern product to have a share of their patronage, hitherto in this respect so jealously preserved for the Russians. Manila hemp was shipped at present only from the Philippines, but there was no reason why it should not be produced for us elsewhere. Around Singapore it throve, and in the Celebes it had received some attention. It could also be obtained from the continent of India. Mr. Simmonds did not mention the Rheea fibre, which ought, and one day would, be a staple product from these islands. The demand for it in this country was almost unlimited. There were many other fibres which, from the samples sent, and reports given of the possible supply, must shortly receive more attention. Our supply of flax was, and had long been insufficient; the price now was far higher than the average of 1854-5, when our

supply was so much interfered with by war. Indian flax would now soon be better known here. Many failures in the attempt to produce fibres were to be attributed to improper seed and cultivation. The Indian plant, always sown thinly, caused the stem to branch out, which rendered the fibre short. Acclimatised seed had produced fine flax in the Punjaub, upwards of 4 feet long, whilst the average length of the native plant was not much more than two feet. Great care and experience were also required, but with the rheea, moorva, and pineapple fibre, perfection was, perhaps, more easily attainable. These were all indigenous to the Eastern Archipelago, and as we could not get flax, the 30 millions of people spread upon that vast expanse of fertile island might surely afford a good supply of valuable fibres as substitutes in return for the manufactures we were now sending, or were hoping soon, to send them.

Mr. JAMES HUNTER, whilst bearing his humble testimony to the great ability and industry displayed by Mr. Simmonds in the preparation of this paper, might be pardoned for alluding to one or two matters upon which he differed from that gentleman. With regard to consuls, he thought they were sufficiently numerous at present, and he should be sorry to see those establishments extended. It must not be imagined that the position of consul enabled those who held it to increase the trade of those islands. Trade required consuls, but consuls could not make trade. Mr. Simmonds had stated that the export trade of Singapore amounted to upwards of £3,000,000 annually, but he did not see why it should not amount to £50,000,000; and there had been coupled with that the observation that our trade with the Eastern Archipelago was more limited than it ought to be. If Mr. Simmonds had followed up that remark by pointing out the means by which that trade could be extended, he (Mr. Hunter) would have been glad to take the hint. As to the coffee grown in Sumatra, that was not owing to the industry of the inhabitants, but because the Dutch government compelled them to grow it. If Sumatra belonged to England, he did not think the inhabitants would be compelled to grow coffee, as was now the case. With regard to the proposition to add Sarawak to the number of British Colonies, he thought they had enough colonies already, and the greatest compliment they could pay to Sir James Brooke was to say, if he could not make the colony pay, nobody else could do so. Then it was said that the Island of Labuan produced 5,000 tons of coals annually. That would not pay half the salary of a Governor, and he did not think they wanted any more Labuans. With regard to cotton, if they did not continue to have it from America, he thought it would be a long time before they got any of that article from the Eastern Archipelago. As to the desirability of having naval establishments on the north coast of Australia, he thought they had quite enough of them all over the world. It would only be the grave of unfortunate officers, for it was a very unhealthy place, and there would be nothing for them to do when they got there. As to New Guinea, the climate was altogether so bad that no European gentleman who came back alive ever desired to go there again. The population was small, and hostile to Europeans. They had no wants; they went about naked, were complete savages, and did not know what commerce meant. The trade of New Guinea had not increased within the last fifty years, and he did not think it would do so in the next half-century.

Mr. E. W. TRENT expressed his regret that Mr. Simmonds had not informed them how the Manila hemp was prepared. It was a curious coincidence that, although this plant was known to exist throughout the tropics, yet Manila was the only place from which they received any supplies of that article. The time had come when this country must depend more than ever upon its manufactures and commerce, and it would be highly beneficial if intelligent men were sent out to various parts of the world to seek for the raw materials which were so largely in demand for our manufactures. With regard to the fibres of tropical countries, he thought one of the greatest difficulties they had to contend with was the bad way in which they were prepared and packed for exportation. Mr. Noble showed him upon one occasion some hemp from Turkey. In the state in which it then was it was scarcely saleable, but upon manipulation it produced a most beautiful fibre. It was sent to this country in a bad state, and it came into the broker's hands to be sold for what it would fetch. There was scarcely a fibre that they received from India and other places which was not greatly deteriorated in value from the imperfect way in which it was prepared and packed. The Bombay hemp, which was of itself a good article, came over to this country in such a state that one of his (Mr. Trent's) strongest workmen had been poisoned in working upon it, and it was only by paying exorbitant wages that the men could be induced to work upon it at all. He believed a complete revolution in these matters would be brought about by the introduction of proper machinery into India for the preparation of these materials. They had Russians and others coming over to this country and obtaining all the information they could upon this subject, whilst our own countrymen were content to remain apathetic upon it. He was convinced that if proper attention were paid to this subject, they might be independent of the continent for their supplies of hemp and flax. The paper trade was likely to be seriously affected by the export duty upon rags, and it would probably be the same with flax. They were just as likely to put an export duty upon that article, which would put an extinguisher upon the trade in this country. The loss of property during the Russian war was frightful to contemplate. Men who were worth from £50,000 to £100,000, through the sudden rise in the price of hemp, and wishing to keep their hands employed, were brought to bankruptcy; their valuable machinery was brought to the auctioneer's hammer, and was bought by brokers who could not pay the money down and were allowed long credit, and that machinery had been hawked about the continent to supply the demand which existed there. He thought the time was come when able practical men ought to be employed to travel to various countries where these valuable products could be obtained in great abundance, if under proper superintendence in the early stages of manipulation and preparation for sending to this country. He thought able papers, like that which had been presented to them that evening, ought not to suffice for the gratification and amusement of the moment, but ought to result in something being effected of a practical and useful character.

Mr. WILLIAM HAWES said, very contradictory opinions had been expressed in the course of this discussion. On the one hand it was argued that they ought to encourage trade with these portions of the globe by the establishment of consuls; and on the other hand it was said that the trade of those islands was not worth their attention; whilst the last speaker had urged that these districts should be further explored, and more information collected as to the nature of their products, and the means of transporting them to this country in such a condition as to be really available for our manufactures. This paper was one of a series on similar subjects which had been read before this Society, and they were of great utility. A mass of information had been presented which might not, perhaps, produce beneficial results at the present moment, but it was for those who were interested in the subject to consider it and turn it to useful account hereafter. That was the sole object of the paper that evening. It was only by the collection of information from all sources, and placing it in a well-arranged form before a meeting of this kind, and circulating it, through the medium of the *Journal*, that the public could be supplied with a knowledge of those subjects, so as to be able hereafter to turn the facts thus collected to a beneficial account. He thought Mr. Simmonds had

rather overdone the subject by the large amount of detail he had brought before them. From a vast collection of facts he had left them to draw their own conclusions. All Mr. Simmonds professed to say was, "There are immense districts of country with which we have at present comparatively little trade, but it is my opinion that with a proper amount of industry and attention a very large trade may arise." And what were the figures brought forward in support of that position? He would take one of the districts which had been spoken of as so little worth attention, Sarawak. He found that from 1854 to 1860 the tonnage of exports had increased from 9,000 tons to 15,000 tons, and the value from 600,000 dols. to 900,000 dols. They were aware of the adverse circumstances connected with that trade, and if such success was achieved in one particular district, they ought to give Mr. Simmonds credit for results equal to those which he anticipated would be arrived at if the whole of this vast region were opened out to British industry, and protection afforded from the depredations of the pirates. He thought the utmost attention being given to commerce in this quarter would repay the government for the expenses of consuls and naval establishments sufficient for the protection of the trade that might arise.

Mr. Trent wished to bear his testimony to the zeal which the East India Company had for many years displayed in collecting various fibres available for the manufactures of this country. There had been an immense amount of zeal, but very little knowledge. He believed that £2,000 worth of machinery would create an entire revolution in the Indian fibre trade.

The Chairman said the question of piracy had been mentioned, and the people of Johore had been charged with organising those depredations by sea. Now, the fact was there were no pirates at Johore. It was subject to the native prince from whom they purchased—for he (Mr. Crawfurd) had purchased it out and out—the island of Singapore; and he was a good ally, or rather a subject, of the government of this country. He was glad to inform them that he was by far the richest prince in the whole Malay Archipelago, his income being probably some £15,000 a year, which would easily buy up all other Malay princes. He was living in a very comfortable way, was a discreet and temperate man, and entertained his European visitors in handsome style. He was, therefore, not likely to encourage piracy. But there was a time not very far back, when the people of Johore had a bad reputation, and the very name of Johore was still used as equivalent to "pirate." With regard to the spices, there was no monopoly of spices by the Dutch; there was now no cutting down either of clove or nutmeg trees. The nutmeg plantations of Banda were the property of the Dutch, but there was no monopoly there or elsewhere in the Dutch possessions. The nutmeg, which some people thought a great deal of, had been introduced into Benkulen, Penang, and Singapore, but, as far as that island and the Malaccas were concerned, it was a failure. A disease attacked the plant, and it did not thrive except with great care, and the produce was not worth the time bestowed upon it. He had predicted that the clove and nutmeg in our own possessions would never become rivals of those which existed in their native soil and climate. But we never could want an abundance of those spices. The consumption of them in this country, instead of increasing, scarcely kept pace with the growth of the population. There was a time when these productions were thought to be of prodigious value, but for his own part he thought them paltry in comparison with other staples of those countries. He had no respect for them except from the fact that the attempt to trace the spice islands led to the discovery of America by Columbus. On that account only he had respect for the clove and the nutmeg. A great deal had been said about flax fibres. The paper he (the Chairman) recently read before the Society was too lengthy to admit of his reading the whole of it, but there was a good deal of discussion upon it. The majority of the speakers were opposed to his views upon the subject of cotton supply. He thought he was right, and that the majority were wrong, but the discussion was carried to such a late hour that he had no fair opportunity of replying. With regard to flax, he would remark that they received an enormous quantity of seed from India but very little flax indeed. Why was that? Principally because the Hindoos were too unskilled to be able to prepare the fibre, but there was no reason that he knew of why India should not produce as good flax as Belgium. With regard to consuls, he thought some were, perhaps, overpaid, and did very little good; at the same time he was sure they did good in some places. A consul could not make trade, but he was necessary where trade existed. He was not aware that the consuls at Java received a salary. There were formerly three consuls at that important island, but two had been dispensed with, and the third was a merchant. He did not object to consuls being paid, but he did not approve of their acting as merchants in the places in which they held their office. He would now say a word or two with regard to the trade of this Archipelago. Having been engaged in the preparation of some statistics for the Colonial Office with regard to the trade of the Straits Settlements—Singapore and Malacca—he had compared it with the trade of the whole continent of India and the trade of Batavia. The possessions of the Dutch amounted to about two-fifths of the whole Archipelago. In speaking of the Indian trade, he found that the total amount of the trade of Bombay, exports and imports was £37,400,000 per annum; that of Calcutta, including the fertile valley of the Ganges, £32,500,000, that of Madras was only £9,000,000; whilst that of the Straits settlements amounted to no less than £14,800,000 per annum. So much for the trade of the Straits settlements as compared with that of the principal parts of continental India. The trade of Java amounted to £14,300,000, so that they found the trade of the little Straits settlements exceeded that of the important island of Java by about half-a-million sterling per annum. The trade of the Philippines was £7,000,000, or about half the value of the trade of Java, which made the entire trade of the Indian Archipelago upwards of £36,000,000 per annum, and those who lived five-and-twenty years longer, he had no doubt, would see that trade doubled in amount. There were a few articles of commerce which he would touch upon very shortly, one in particular, which he believed had been omitted by Mr. Simmonds, but it was one in which this Society had shown considerable interest—he alluded to gutta-percha. It happened that a medical gentleman travelling in that country, and seeing the manifold purposes to which gutta-percha was applied by the Malays, thought that it might be well adapted for splints, and other surgical appliances. He, therefore, collected a quantity of it, and, amongst others, sent a specimen of it to this Society, for which he was awarded the Gold Medal of the Society of Arts. He believed that was all the reward the discoverer of that wonderful substance ever received, for without that they would probably never have been able to communicate in five or ten minutes between St. Petersburgh and London. He found that the exports of gutta-percha amounted to between 900 and 1,000 tons a-year, representing a value of £156,000. The discoverer of that article was Dr. Montgomery, his (the chairman's) nephew. He would mention one other circumstance in connection with this subject. He had already stated that the only public recognition of Dr. Montgomery's discovery was the award of the gold medal of this Society; but after his death he left some sons to be provided for, and he was happy to say that his (the chairman's) application to the Board of Control was successful in obtaining through the present Lord Lyveden a cadetship for one of Dr. Montgomery's sons, on the ground of this discovery. Sago had become an important article of com-

merce, and it was to the Chinese they were indebted for the manufacture of it in its present improved state. Certain Chinese knowing that the English people were rather nice in their articles of food, set themselves to improve upon the brown ugly article that was at first supplied, and the preparation they now enjoyed was the result. The coal of Labuan Mr. Simmonds had not quite done justice to. It was of excellent quality. The working of it had been discontinued upon some estates, but a society of persons had now been formed to work this coal, and he had no doubt a large quantity would be raised. It surpassed in quality the coal of any of the Dutch settlements. In order to show the extent to which trade was increased by mere freedom, he could mention one circumstance. He went one day to the Board of Trade, and a gentleman who had rendered great service to this country in an official capacity—the late Mr. Porter—showed him a handfull of black-looking seeds, and asked if he could tell him what they were, when he referred him to the Arabian Nights, "Open Sesame." It was now largely imported into this country, and produced an excellent oil. The history of coffee most of them were no doubt acquainted with. That plant was known to the Arabians long before the discovery of America. A Dutch gentleman, who had taken a fancy to Batavia, requested that a few fresh coffee seeds should be sent to him. Some of these seeds had been planted in the Botanical Garden of Amsterdam, and some plants were raised in hot-houses there. A portion were sent out to him, and from those had sprung the supply of coffee which the European nations had since received. He had only one more article to mention, viz., antimony ore. Whilst he was administering the civil government of Singapore, he was not only the governor, but also the censor of the press and the writer of the leading articles in the newspaper, for there was nobody else to do it. He went one day into the bazaar and saw a lump of metal which he knew nothing about. He, in the first instance, thought it was galena, or lead ore, but he ascertained it was ore of antimony, which had been brought from Borneo—from Sarawak. A portion of the metal was smelted at the shop of a Chinese, and a small button was made. The Chinese, seeing that, tried to obtain tin and lead from it, but to no purpose. That ore was brought from Sarawak, and produced a very considerable revenue to Sir James Brooke. Our principal supply of antimony was derived from that country. With regard to Borneo, he begged leave to express a different view of it to what had been given by his friend on his right. He (the Chairman) thought it anything but an agreeable island. The very character of its inhabitants showed clearly that it had a stubborn soil and possessed no natural advantages, because if it had it was to be presumed, that having the same race of people as inhabited the contiguous islands, they would have kept pace with them in progress and civilisation, that they would have become decently clothed, and have made some advance in letters. Yet they had not done so, and were arrant savages to the present day. There were two little islands to the east of Java, with about one million of inhabitants, having a civilised population, carrying on a large trade, and a very respectable sort of people. He ventured to say that those two paltry little islands, which had not the thousandth part of the area of Borneo, contained as large a population as the whole of the latter island. It was a community of savages, cutting off people's heads, pickling them, and wearing them as ornaments. That portion of the population of Borneo who were tolerably civilised were all foreigners—the Malays were foreigners, and the Chinese, of course, were foreigners. He was satisfied it was the natural difficulties of the country that prevented the inhabitants of Borneo from improving in their condition in the same manner as the population of Java, Sumatra, and the Celebes had done. He begged, in conclusion, to propose a vote of thanks to Mr. Simmonds for his paper.

In reply to the inquiry of a member,

The CHAIRMAN added that there were many different plants, both in India and America, which produced india-rubber. It was abundant in the forests of almost every tropical country, and there were no reasons to apprehend any lack of the supply of that commodity.

The vote of thanks having been passed,

Mr. P. L. SIMMONDS said it would certainly be of some advantage, for the purposes of discussion, if the papers to be read were printed in advance in the *Journal*, so that the author might have the full benefit of all his facts and opinions being fully known and duly considered, whereas with a long paper, containing many figures and statistical facts, it was quite impossible to read it in full, or even if read, for the audience to follow closely the figures. In reply to the inquiries and observations of many of the speakers, he must follow the plan of Abernethy, who used to refer his patients to his book, so he must ask them to read his paper when published in the *Journal*. Therein they would find much of the information as to growth of spices, the culture and manufacture of Manila hemp, gutta-percha, and india-rubber, and Labuan coal, and other questions that had been started, but there were one or two remarks to which he desired to reply. Firstly, it was highly satisfactory to find, from the statistical facts adduced by Mr. Crawfurd, that his (Mr. Simmonds's) observations on the importance of the trade of the Indian Archipelago were fully borne out. If our Straits Settlements, which produced comparatively little or nothing themselves of commercial importance, were already the centre of such an amount of trade, what might not be looked for in a few years hence, when the resources of these fine islands became more largely developed? He could not agree with the speaker who had deprecated the services of consuls. It was true a great reduction was being made in our consular service, but it was questionable whether this was always effected in the right direction. He believed, even in new countries, an intelligent consular agent might do much to stimulate trade. And he would refer, as an instance, to the very valuable yearly consular reports which were now issued through the Foreign Office (although rather slowly), in which merchants, manufacturers, and shipowners would find an amazing account of valuable information as to the trade, resources and capabilities of different countries. Many a new article of commerce had been thus developed by one active mind, as had been so well alluded to in the case of gutta percha by the Chairman. He believed, when it became generally known that the particular species of plaintain which yielded the Manila hemp of commerce, could be propagated from the seed—and he believed the seed had already been distributed through the scientific director of Kew Gardens—the culture would be extended to many of our colonies. Although there was at present a decline in price for this material, in consequence of the disturbed state of North America, which had hitherto been the principal market, the value of the white rope and other fabrics made from it were, as had been observed by Mr. Manning, as yet but imperfectly appreciated, and its use might be largely extended from its being a light, strong, and durable textile material. With respect to the charge of pirate ships being fitted out from the Johore peninsula, which had been indignantly refuted by one speaker, he should be sorry if, from the vagueness of his observations, it should be inferred that the ruler of that country had any participation in, or cognizance of, such proceedings. Personally he could not speak on this matter, but, as a careful reader of the Singapore newspapers, he saw the statement frequently made that piratical craft did occasionally sally out even from creeks in the Straits of Malacca and around the Malayan Peninsula. They might be Chinese or other marauders, for aught he knew, and the name Johore, as Mr. Crawfurd had stated, might have become applied to them improperly. There was but one other point to which he would allude, and that was as to the soil and capabilities of Borneo. He thought it could scarcely be so unpromising as was repre-

sented by the Chairman, looking at the numerous and magnificent vegetable products, wild and cultivated, with which many of the tables before them were covered. True the natives might be averse to or incapable of cultivating products, although the latest accounts, as he had shown them, seemed to refute this, for they had entered upon sugar and sago culture, and pepper and tobacco were extensively grown, while cotton, coffee, and rice were also raised in small quantities. Now the large accession of population in Malays and Chinese which had been drawn there, would counteract the effect of the indolence or hostility of the native tribes. He was glad that the subject had been so thoroughly discussed, for that, as he had stated at the outset, was his main object in bringing it forward.

A large collection of Specimens, described at the conclusion of the Paper, were on the table. Maps and Diagrams were kindly contributed by the Royal Geographical Society.

The Secretary announced that on Wednesday evening next, May 15, a Paper, " On the Hythe School of Musketry Instruction in Rifle Shooting," by Mr. John MacGregor, would be read. On this evening Lord Elcho, M.P., will preside.

ARTISTIC COPYRIGHT BILL.

In the House of Commons, on Monday last, the 6th inst., the Attorney General moved the second reading of this Bill.

Mr. Walter—Sir,—I wish, before this Bill be read a second time, to call attention to one feature of it which appears to me to be open to serious objection, and which, in my opinion, requires the careful attention of the House. This is a measure, sir, of great importance, and yet I apprehend that few honourable members have taken the trouble to read its various clauses. It is a measure which, if passed in its present shape, will seriously affect everyone in the kingdom who may at any time become the purchaser of a modern picture. I shall not be presumptuous enough to criticise the construction of a bill endorsed with such weighty and influential names as those which appear on the back of the present measure, but still I may be allowed to observe that there is some slight want of harmony between the bill and its title. The Lord Chancellor recently stated in another place that the object of the bill was to protect artists against pirates and impostors. If the bill only went that length, if those objects were all which it proposed to carry out, I should be the last man to offer any objection to it, but if honourable members will look closely to its provisions, they will find that it goes a good deal farther. If they examine the third clause, they will find that the protection is extended to artists not only against pirates and impostors, but actually against every man who happens to be a purchaser of pictures. The third clause provides that "the author of every picture, work of sculpture, and engraving which shall be made, or for the first time disposed of after the passing of this act, and his assigns shall have the sole and exclusive rights of copying, reproducing, and multiplying such work, and the design thereof, by any means, of any size, and for any purpose, for the term of the natural life of such author and thirty years after his death." Now, if I read that clause correctly, the effect of it will be, that any person who purchases a picture, or according to the sixth clause, who may have purchased one seven years before the passing of the act, will be deprived of the power of permitting any friend to copy it, or of having it engraved himself. If these provisions should become law, it is certain that very few persons indeed will like to purchase works of art encumbered with such stringent conditions. In fact, I look upon the third clause as a serious infringement upon the liberty of the subject. We have been recently engaged in the discussion of a curious tenant-right bill, but it appears to me that to allow an artist, after he has sold a picture, to retain a copyright in it, and thereby to deprive the real owner of those rights which, according to common sense, he has purchased with the work, in my opinion quite surpasses that tenant-right bill in absurdity, and is about as unreasonable a proposition as ever was submitted to parliament. Although myself a great lover of the fine arts, my taste lies more in the direction of ancient than modern pictures, and, therefore, there is not much danger of my being personally affected by the operation of the bill, but if I were a purchaser of modern pictures, nothing would induce me to buy one which such conditions attached. The third clause I look upon as a great infringement upon the rights of property and the liberty of the subject, and if I wanted to have a picture copied, I should consider such an enactment as an unwarrantable interference with that liberty and those rights. Let us suppose a strong case. Suppose a person to order a portrait of himself, the natural supposition would be that to the owner of such a picture, the person who had commissioned and paid the artist, the copyright should belong; but according to the present bill, the artist is to retain the copyright, and the effect will be that any gentleman who may have his portrait painted and exhibited in the National Gallery, will be prevented having it photographed, and from having it copied or engraved for any purpose whatever. I therefore must repeat that I regard the third clause with jealousy and dislike, and I shall be glad to hear that it is not the intention of the Government to insist upon its insertion. So far as the bill protects artists against pirates and impostors, it shall have my cordial support, because I believe that every artist is entitled to the secure enjoyment of any copyright of which he may be the real owner. But I contend that neither artists nor engravers should be allowed to retain a right in any work of art which they have parted with for a pecuniary consideration. If the third clause be not altered in committee by the promoters of the bill, I shall take the liberty of proposing some amendments.

Mr. Coningham—There are, no doubt, many objections which may be fairly raised against the bill, but the question is whether they do no not more fairly call for discussion in committee than on the motion for the second reading. The fifth clause, however, is so remarkable that I cannot allow it to pass without some observation. It provides that "no copyright shall be acquired in any work of fine art, or in the design thereof, until the name or monogram of the author or maker thereof shall have been legibly signed, painted, engraved, printed, stamped, or otherwise marked upon the face, or some other conspicuous part of such work." Why, there is nothing more easily imitated than a monogram, and therefore this clause in reality offers no security at all. If an artist, through forgetfulness or chance, should omit to put his name or monogram to a picture, in that case the fifth clause would deprive him of all copyright in his work. It is not the monogram which proves the work of the artist, but that skill and peculiarity of style which can never be imitated.

Lord Fermoy—Sir,—There are some portions of this bill to which I, also, must object. It has been prepared by the Attorney-General, no doubt in the interest and at the suggestion of artists, but in my judgment he has gone a little too far in his protective provisions. The sound principle and common sense of the thing is that if an artist part with a picture, or an engraver with a plate, the copyright forms a portion of the sale, and any attempt to legislate upon a different principle would only be inflicting injury on artists themselves by deterring the public from purchasing their works. Artists, like other men, must bring their wares into the market, and must depend upon the competition of buyers for their reward. If the law cripple the rights of purchasers, the latter are sure to diminish, and the result will be that works of art will not

command remunerative prices. My impression is that the bill, as it now stands, will create an injurious monopoly, and that it will also have the effect of keeping prints and photographs of some of our finest pictures out of general circulation.

Mr. Layard—Sir,—I should feel exceedingly reluctant to oppose this bill, having a great respect for the eminent artists whose suggestions it embodies, but I trust that the Attorney-General will give the matter some serious consideration before he asks the House to give it a second reading. The bill defines a design to mean a conception or an idea, or a composition, embodied in a work of art. Now, definitions, it is said, are always dangerous, but to define what is a composition, or an idea, or part of an idea, would, I believe, defy the logic of the Attorney-General himself. Again, who shall define the strict meaning of the word originality. If this bill had been law in ancient times, the great masters themselves would have been exposed to fine and imprisonment, for nothing is so difficult to decide as to what is original, or what has been copied in a work of art. Some of Raphael's finest pictures were copied, with slight variations, from preceding artists, and in art's most brilliant period, namely, the fifteenth century, the ideas of the artists of the fourteenth century were laid under frequent contribution. I believe that no gentleman would like to purchase a work of art saddled with such conditions as are here inserted, and therefore I do not think that the bill will be of any advantage to artists themselves. The great masters of antiquity, and their worthy modern successors, such as Turner and Reynolds, required no bill — their genius protected them from imitation. To say that artists retain a property in their pictures after they have sold them is simply absurd. If they had such property they could compel the purchaser to take care of their works, whereas the latter may as we all know, thrust all his pictures in the fire if it suits his fancy. Of course there might, in some cases, be a special contract, and then, of course, there would be special clauses and conditions, but, as a general rule, the power of a purchaser over his pictures is as I have stated. Of one provision of the bill I heartily approve, and that is the clause which makes the imitation of an artist's monogram a forgery, and treats it as a misdemeanour. That provision will give a legitimate protection to artists, but I do not see why there should be all this jealousy of photographing and engraving, because, in my opinion, the more paintings are engraved the better for the reputation of the artists. Looking at the bill as a whole, I am afraid that its effect will be to throw works of art rather into the hands of traders than of amateurs, and this would be a result which would not be at all calculated to promote our national progress in the fine arts.

The Attorney General—Sir,—I had not anticipated any objections to this stage of the bill, and as those which have been urged refer entirely to details which can be discussed in committee, I am unwilling to trespass now on the attention of the House by making any general exposition of the objects we have in view. To some of the observations which have been made I must make some reply. The first objections were those of the honourable member for Berkshire, but I would suggest to that honourable member that he has forgotten the difference between the purchase of a picture and the acquirement of its copyright. It would be perfectly competent for the purchaser of a picture to propose to buy it out and out, when of course, he would give a proportionally enhanced price, and would have the indisputable right of dealing with his purchase as he liked. If, on the other hand, he bought the picture, simply as a picture, he would have the gratification and pleasure resulting from its contemplation; but was it right that he should have photographs and engravings made from it, using it for a different purpose from that for which the artist sold it, and interfering with the right of the latter to repeat his conception himself? If a person bought a book he could read it, but could not multiply copies of it, unless he purchased the copyright, and this was his reply to the objections of the honourable member for Berkshire, and of the noble lord the member for Marylebone. In many cases the remuneration of the artist arose from the power of engraving his picture, and it was quite clear that he could reserve that power if the purchaser did not choose to buy it along with the picture. Besides, the power of buying a copyright would be as great an advantage to the purchaser of a picture as to the artist, for how often does it happen that we see repetitions of works of art, and every repetition diminishes the value of the original composition. Collectors should recollect that this will be prevented by the present bill. In answer to the objection of the honourable member for Brighton, I must observe that it was necessary to define something the imitation of which should enable us to apply the criminal law, and that therefore the object of the provision referred to is to render the application of the law of forgery more easy, and likely to be successful. The honourable member seems to think that the value of the pictures would be degraded by the adoption of this provision, but is he not aware that all the ancient masters affix monograms to their most celebrated works?

Mr. Coningham.—I beg to assure the honourable and learned gentleman that I made no objection to an artist attaching his monogram to his pictures. I spoke in his interest, and pointed out that where he had forgotten to place his monogram his copyright would be lost.

The Attorney-General—What I said was that under the bill it would be forgery to imitate the signature, but that was simply because the signature decided the evidence of ownership, and because without such a provision it would not be easy, or in fact practicable, to apply the ordinary criminal law. Of course where authorship could be proved by other means, the artist's rights would remain the same. Turning to the honourable member for Southwark, he surely must have met, in reading works upon the fine arts, with such expressions as "the idea present to the mind of the painter, and embodied in his picture," and "the conception of his work formed by the sculptor." I believe the fact to be that all painters and other artists work not directly from an extrinsic object, but from a conception which they have derived from such object, and which, having digested and completed in their minds, they endeavour to represent in their works. I do not see, therefore, that there need be any difficulty in finding language to protect the artist in the copyright of his conceptions. It is in fact the only mode in which you can secure to him the real ownership and property in that which constitutes the distinctive feature and character of his work. The honourable member also asked how part of an idea could be plagiarised, but the explanation is exceedingly easy. Let us suppose that the principal figure were taken from a great picture, or that portions of several works were collected in one design, and that this collection of stone and parts were reproduced as an original, then it would be easy to see how part of an idea might be pilfered. These are, however, difficulties which can all be cleared up and smoothed away in committee, where I shall be most happy to hear the criticisms and to receive the suggestions of the honourable member. The house must recollect that the bill before it is the first legislative attempt to do justice and to give protection to the artists of this country, whilst there is no other country in Europe in which such protection has not long since been secured. The hon. member's argument that artists would thrive best without protection, would apply with equal force to authors, and yet the right of the latter has long since received legislative sanction and protection. Why, then, should we refuse a similar protection to artists? It is admitted that everyone should have a property in that which is the work of his hands, but how much stronger becomes his vested right when that work is the conception of his mind embodied in a painting or a statue. Are we going to deprive the artist of his just and proper

protection, and that which is, after all, the highest and the noblest property in the world? The principle of protection is established with respect to the author, and it is high time that the artist should also taste its advantages. Parliament has extended the period during which property may be engaged in works of the mind when embodied in books, but let us remember that while a book speaks only to those who are conversant with the language in which it is written, the language of painting and sculpture is universal, and can be understood and appreciated all over the world. Let us, then, put the artist on the same basis of security as the author, and we shall see that this bill, if passed, will prove no more injurious to art than has the extension of the Copyright Act been discouraging to literature. Art and literature spring from the same source and stand on the same foundation. They have the same right to protection, and it would be an honourable distinction for this present session of Parliament, if it be signalised by the passing of an act of practical, though tardy justice in respect to works of art.

The bill was read a second time, and ordered to be committed on Thursday, the 9th inst.

MEETINGS FOR THE ENSUING WEEK.

MON. ...Geographical, 8½.

TUES....Royal Inst., 3. Mr. John Hullah, "On the History of Modern Music."
Syro-Egyptian, 7½. Mr. Ainsworth, "Ruins of Chaldæa."
Civil Engineers, 8. Continued Discussion upon "The National Defences."
Medical and Chirurg., 8½.
Zoological, 9.

WED. ...Pharmaceutical, 12. Anniversary.
Literary Fund, 3.
Society of Arts, 8. Mr. John MacGregor, "On the Hythe School of Musketry Instruction in Rifle Shooting."
Ethnological, 8½. Anniversary.

THURS....Royal Inst., 3. Mr. Pengelly, "On the Devonian Age of the World."
Zoological, 4.
Royal Soc. Club, 6.
Chemical, 8. Mr. W. H. Perkin, "On the colouring matters obtained from Coal-tar."
Royal, 8½.
Antiquaries, 8½.

FRI.... ..United Service Inst., 3. Lieut.-Col. H. W. Norman, "Warfare in India."
Royal Inst., 8. Professor J. C. Maxwell, "On the Theory of Three Primary Colours."
Royal Inst., 3. Prof. Max Muller, "On the Science of Language."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, May* 3rd, 1861.]

Dated 15th February, 1861.

382. E. Poulson, 3, Strathmore-terrace, Shadwell, Middlesex—Imp. in velocipedes, applicable also for propelling carriages, barges, and boats.

Dated 22nd March, 1861.

728. C. E. Swindell, J. Russell, and J. Price, Withymoor, near Dudley, Worcestershire—Certain imp. in the manufacture of horse nails.

Dated 6th April, 1861.

850. R. Wallwork, Bolton-le-Moors, and T. Sumner, Farnworth, near Bolton-le-Moors, Lancashire—Certain imp. in machinery for preparing cotton and other fibrous substances.

Dated 10th April, 1861.

878. T. A. Weston, Birmingham—New or improved fastenings for fastening bands and belts and articles of dress, and for such other purposes as the same are or may be applicable to.

Dated 11th April, 1861.

892. T. Don, 10, Poultry, London, T. Smith, Tenter-lane, and L. Horsfield, Bank Foundry, Leeds—Imp. in the method of and apparatus for drying and preparing grain, seeds, or berries, for food and other purposes.

Dated 12th April, 1861.

904. J. Douglas, 255, Blackfriars-road—Imp. in kitchen ranges.

Dated 13th April, 1861.

906. J. C. Rivett, Farnworth, near Manchester—Certain imp. in machinery for carding cotton and other fibrous materials.

Dated 17th April, 1861.

938. T. Jones, Bolton-le-Moors, and G. Mallinson, Salford, Lancashire—Certain imp. in the manufacture of piled fabrics.

Dated 18th April, 1861.

947. C. Norton, Hanley-street, Birmingham—Imp. in the manufacture of ornamental eyelets.
948. H. Carstanjen, Cologne—Imp. in the apparatus for, and method of, increasing the illuminating power of gas.
949. C. Stevens, 31, Charing-cross—Improved bands for transmitting motion to machinery. (A com.)
950. H. Jones, Birmingham—Imp. in certain kinds of breech-loading fire-arms.
951. T. B. Wilkinson, Deptford—An improved means for securing a watch in the pocket of the wearer.
952. E. Morgan, Liverpool—Imp. in ships' and other pumps.
953. B. Brown and R. Hacking, Bury—Certain imp. in machinery or apparatus to be employed in preparing cotton and other fibrous materials for spinning, called "roving frames" and "slubbing frames."
954. J. Bryson, Worcester-street, Birmingham—Imp. in weighing machines.
955. R. A. Brooman, 166, Fleet-street—Imp. in producing photographic pictures. (A com.)
957. C. Jordan, Newport, Monmouthshire—Imp. in apparatus for drying the mould and cores used for iron or other castings.
958. M. Buchanan, Glasgow—Imp. in gloves.
959. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in electric telegraph apparatus. (A com.)
960. W. Benson, Hexham, Northumberland—Imp. in the construction of furnaces, for the better combustion of fuel and the prevention of smoke.

Dated 19th April, 1861.

961. A. F. Eaves, Birmingham—An imp. or imps. in the manufacture of the bezels or rings used in glazing the dials of clocks, barometers, and steam gauges, and for other like purposes.
963. J. M. Brierley, Manchester—Imp. in the manufacture of woven fabrics, applicable to crinoline skirts and petticoats or other similar articles.
965. R. Maclaren, Glasgow—Imp. in jointing or connecting pipes.

PATENTS SEALED.

[*From Gazette, May 3rd*, 1861.]

May 3rd.

2719. W. Jones.
2725. C. Asprey.
2728. J. Higgins and T. S. Whitworth.
2729. T. W. Smith.
2735. J. Clark.
2737. J. and E. Ratcliff.
2740. R. A. Brooman.
2743. W. E. Newton.
2748. J. P. Fittère.
2750. W. F. Henson.
2760. J. W. Wallis.
28‹5. S. Walker, jun.
2906. G. Ennis.
2932. R. Offord, jun.

[*From Gazette, May 7th*, 1861.]

May 7th.

2749. H. J. Distin & A. H. Siebe.
761. J. Chesterman.
2765. F. Trouvé.
2766. T. B. Daft and W. Pole.
2767. J. Glen.
2768. E. B. Wilson.
2770. F. Walton.
2775. M. A. F. Mennons.
2776. M. A. F. Mennons.
2277. M. L. Henrionnet & L. O. Boblique.
2778. M. A. F. Mennons.
2781. W. Roberts.
2783. J. Juckes.
2793. T. A. Blakely.
2802. A. Henry.
2817. E. B. Wilson.
2924. N. Ager.
2945. R. Dawbarn.
2963. E. T. Hughes.
3031. W. E. Newton.
3079. W. E. Newton.
7. D. A. Johnson.
375. G. Searby.
484. J. Howard and E. T. Bousfield.
685. J. J. O. Taylor.
693. T. Brooks.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, May 3rd*, 1861.]

April 29th.

965. E. T. Hughes.

April 30th.

972. J. H. Johnson.

May 1st.

992. W. E. Newton.

[*From Gazette, May 7th*, 1861.]

May 2nd.

985. J. Taylor.
1043. I. L. Bell.

May 3rd.

989. J. Swain and M. Swain.
1007. W. Heap.

May 4th.

1017. W. Wallis, W. Langford, and J. Slack.
1038. R. B. Goldsworthy.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, May 3rd*, 1861.]

April 30th.

974. W. Macfarlane.

May 1st.

1032. C. B. Normand.

[*From Gazette, May 7th*, 1861.]

May 2nd.

996. M. Poole.

May 3rd.

1006. E. Haseler.

May 4th.

1015. J. G. Jennings.

Journal of the Society of Arts.

FRIDAY, MAY 17, 1861.

INTERNATIONAL EXHIBITION OF 1862.—GUARANTEE DEED.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £403,200, have already been attached to the Deed.

GUARANTEE FUND FOR THE EXHIBITION OF 1862.

The following additions have been made since the last announcement, in the *Journal* for May 10:—

*** *The name marked with an asterisk is that of a Member of the Society of Arts.*

NAMES.	AMOUNT.	REPRESENTING THE OBJECTS OF THE SOCIETY—ARTS, MANUFACTURES, AND COMMERCE.
Robinson, Bellville, and Co., 64, Red Lion-street, Holborn, W.C.	£100	Commerce.
*George Morgan, 2, Danes-inn, Strand, W.C.	100	Arts.
C. E. and J. E. Potter, Belgrave Mills, Darwen, Lancashire	500	Manufactures.
John Cabell, Stoke Wesly, Bromsgrove	100	Arts.
Wilkinson, Heywoods, and Clark, Battle Bridge, N.	500	Manufactures.

By Order,

P. LE NEVE FOSTER, *Secretary.*

INTERNATIONAL EXHIBITION OF 1862.

Her Majesty's Commissioners have received information that Local Committees have already been formed at the following places:—

BATH.
James Tunstall, Esq., M.D., Secretary.

BELFAST.
James Musgrave, Esq., Robert Lloyd Patterson, Esq., } Honorary Secretaries.

BIRMINGHAM.
Arthur Ryland, Esq., Mayor, Chairman.
Edward John Payne, Esq., Secretary.

GLOUCESTER.
The Mayor, Chairman.
Rev. C. Y. Crawley, Honorary Secretary.

GRAVESEND.
The Mayor, Chairman.
G. E. Sharland, Esq., Town Clerk, Secretary.

GREAT TORRINGTON.
The Mayor, Chairman.
George Doe, Esq., Town Clerk, Secretary.

HERTFORD.
Philip Longmore, Esq., Town Clerk, Secretary.

NEWARK.
The Mayor, Chairman.
T. F. A. Burnaby, Esq., Town Clerk, Secretary.

NEWCASTLE-ON-TYNE.
Robert C. Carr, Esq., Secretary.

STAFFORD.
The Mayor, Chairman.
— Austin, Esq., Secretary.

STAFFORDSHIRE POTTERIES.
Fred. Bishop, Esq., Hanley, Secretary.

STOCKTON-ON-TEES.
Robert Thompson, Esq., Chairman.
Joseph Laing, Esq., James Bowron, Esq., } Honorary Secretaries.

WALSALL.
The Mayor, Chairman.
Wm. Franklin, Esq., Honorary Secretary.

The following arrangements (in addition to those published last week) have been made in foreign countries to represent the interests of intending exhibitors:—

ANHALT (DESSAU).
Dr. Lange, Dessau, Commissioner.

HANOVER.
The Directors of the "Gewerbe Verein," and the Committee of the "Kunst Verein" are appointed Commissioners.

MECKLENBURG SCHWERIN.
Mons. le Comte de Schlieffen à Schlieffenburg, Güstron, and Mons. Dippe, Conseiller Grand Ducal au Département des Affaires de Commerce et d'Industrie à Schwerin, have been appointed Commissioners.

MECKLENBURG STRELITZ.
The Government of the Grand Duke.

SAXE COBURG GOTHA.

His Excellency the Minister of State will act as Commissioner.

SAXE MEININGEN.

The Ducal Officers are appointed Commissioners.

SAXONY.

Dr. Weinlig, Chef de division du Ministère de l'Interieur, Dresden, Commissioner.

SPAIN.

The Minister of Public Works will attend to communications.

SWITZERLAND.

Le Département de l'Interieur—Section Bureau de Statistique—Berne.

CONVERSAZIONE.

The Second Conversazione of the present Session will be held on Saturday, the 1st June, at the South Kensington Museum. The card for this Conversazione will admit the Member and two ladies, or one gentleman.

ANNUAL DINNER.

The One Hundred and Seventh Anniversary Dinner of the Society will take place at the Crystal Palace, Sydenham, on Wednesday, the 19th June, at 5 o'clock, punctually. The Right Hon. the Earl of Elgin and Kincardine, K.T., G.C.B., will preside.

Members and their friends are invited to be present.

TWENTY-SECOND ORDINARY MEETING.

WEDNESDAY, MAY 15, 1861.

The Twenty-Second Ordinary Meeting of the One Hundred and Seventh Session was held on Wednesday, the 15th inst., Lord Elcho, M.P., in the chair.

The following gentlemen were proposed for election as members of the Society:—

Adams, George William	Montague-house, Addison-road, Kensington, W.
Balleras, Guillermo Esteban	Seville-villa, Carlton-hill, St. John's-wood, N.W.
Brown, J. W.	7, Upper Hyde-park-gardens, W.
Christy, Samuel	21, St. James's-place, S.W.
Clements, W.	Cream-hall, Highbury-vale, N.
Cropsey, J. F.	2, Kensington-gate, Hyde-park South, W.
Crossman, Robert	29, Westbourne-terrace, W.
Edwards, William	Denmark-hill, S.
Follett, Robert B.	25, Norfolk-crescent, W.
Forrest, John	6, Highbury-crescent West, N.
Gregory, Thomas	212, Regent-street, W.
Hannay, Robert, jun.	Springfield, Ulverston.
Hare, Sir John, F.G.S.	Clifton, Bristol; and Chateau d'Hardelot, près Samer, Boulogne.
Hurlstone, F. Y.	9, Chester-street, Belgrave-square, S.W.
Jodrell, the Rev. Sir Edward Repps, Bart., M.A.	64, Portland-place, W.; Sale-park; and Saxlingham Rectory, Norfolk.
Mocatta, Benjamin	29, Gloucester-square, Hyde-park, W.
Oxenham, Hugh	353 & 354, Oxford-street, W.
Ryder, William Henry	17, New Bond-street, W.
Simpson, T. A.	154, Regent-street, and 8, Beak-street, W.
Stagg, George	2, Craven-hill-gardens, W.
Stocken, Frederic	5, Halkin-street, Grosvenor-place, S.W.

The following candidates were balloted for and duly elected members of the Society:—

Arundel, John	Clapham-park, S.; and 1, Gutter-lane, Cheapside, E.C.
Crawfurd, John, F.R.S.	21, Wilton-street, S.W.
Fisher, Charles	Whitehaven.
Sedley, Angelo James	40, Langham-street, Portland-place, S.W.
Simpkinson, Francis	67, Victoria-street, Westminster, S.W.
Sone, John	23, Fenchurch-street, E.C.
Sworder, Thomas	Bedford-road, Luton.

The Paper read was—

ON THE HYTHE SCHOOL OF MUSKETRY INSTRUCTION IN RIFLE SHOOTING.

BY JOHN MACGREGOR, CAPTAIN, LONDON SCOTTISH RIFLE VOLUNTEERS.

The Arms Factory at Enfield and the Musketry School at Hythe are two important establishments added to our defensive resources within the last seven years.

Iron, brass, and wood are taken to the factory, and in one week 2,000 rifles can be produced.* Men with good sight and of ordinary intelligence begin at the school, and in one week they learn to hit an enemy at half a mile.

Enfield and Hythe are complements one of the other, for men without proper instruction would make bad shooting with good rifles, and the best teaching would be thrown away on bad arms.

The object of this paper is to describe how men are taught to shoot under the Hythe system, but we shall not need to enter at all upon the comparative merits of the fire-arms they use, for the mode of shooting with them is

* The long Enfield rifle of 1853 weighs 9 lbs. 3 ozs. The barrel is 3 feet 3 inches long, and has three grooves, with a spiral of one turn in 6 feet 6 inches, and a bore of ·577 inch, carrying a bullet of ·568 diameter, and 530 grains weight, with a charge of 70 grains of powder. The grooves are 15 thousandths of an inch deep at the breech, and 5 thousandths deep at at the muzzle. The following Table is from the "Volunteer Service Gazette:"—

BARREL.

Description.	Weight. lbs. oz.	Length. ft. in.	Diam. of Bore. in.	Windage. in.
Long Enfield (Machine made.)	4 4	3 3	·577	·027
Short Enfield.	3 12½	2 9	·577	·027
Engineers (Lancaster)	3 10¾	2 9	·577-·589 at muzzle ·580-·592 at breech	·027
Navy	4 2½	2 9	·577	·027

GROOVES.

No.	Width.	Depth.	Description.	Spirality.
3	·262	·005 to ·015	Twist Uniform. Depth Progressive.	1 turn in 78 in.
3	·262	·014	Uniform.	1 turn in 78 in.
-	—	—	Elliptical.	Gaining Twist.
5	—	—	Uniform.	1 turn in 48 in.

Bullet, wood plug—length, 1·09 in.; diameter, ·55 in.

Weight of bullet, 530 grs.; charge of powder, 2½ drs.

There are 58 parts of a rifle; on an average each part goes through 30 operations, or about 1,500 operations in all. The expenditure at Enfield last year was at the rate of about £2 for every rifle manufactured. Rifles of the Enfield pattern are produced also at private factories. The largest of these, that of the London Armoury Company, in Bermondsey, can turn out 400 stand a week.

almost the same for all. There are also other numerous adjuncts of rifle shooting which, though intimately connected with its practice, and the subjects of experiments at Hythe, are not within the scope of this paper. We shall, therefore, not dilate on the construction of the rifle in the stock, lock, and barrel, or the slings and sights, the form, materials, and size of the powder, bullet, and caps, the nature of ground for ranges, or the butts, mantlets, targets, signals, and registers.

If, then, we limit our consideration to the essentials taught at Hythe for the effective use of the Enfield rifle, we find they consist of instruction given to the mind, the eye, and the limbs.

The mind is taught the reason for rules, and their application, so as to load, fire, and clean the rifle with speed, precision, and safety.

The eye is taught to judge the distance of an object, and to aim at it.

The limbs are taught readily to assume a position which shall be steady during fire, and the limbs and eye are tutored so to act in unison under the mind, as that the finger presses the trigger during a short instant, while the body steadies the rifle, and the eye brings three points into one line.

Shooting with the Enfield rifle is different from shooting with a musket, because in the latter, mental calculation as well as aim with the eye is required at the moment of firing, whereas with the new arm, as much as possible of the mental process is accomplished beforehand by him who judges the distance, by him who constructs the sights, and by him who, in adjusting them, (before aiming), allows for the present circumstances as to strength of powder and of wind. Again, learning to shoot at Hythe is like learning to write by copy, beginning with the slowest and simplest strokes; whereas the common mode of becoming a good shot with a fowling-piece is like that of him who, with a genius for drawing, rapidly dashes off a series of sketches from fancy, almost without rule, and thus gradually arrives at success by instinct and practice, without knowing precisely why his first efforts were failures.

The perfection of the Enfield rifle, and the excellence of the system of Hythe shooting, will be better appreciated if we glance briefly at some of the fire-arms of former days and the modes of using them.

FIG. 1, A.D. 1430.

Fig. 1 represents the earliest representation I can find of the manner of firing a "hand gun." This was at the siege of Lucca, in 1430.* The barrel is fixed on a stick, held under the right arm, while the right foot is advanced and the right hand applies a match.

About 60 years later, a similar gun was used on horseback at the seige of Fournice, in 1495, (see fig. 2). The barrel was supported by a swivel rest from the saddle, and the stock hung against the breast by a band round the neck. In this manner also the matchlocks with short stocks were used.

FIG. 2, A.D. 1495.

The matchlock was an improvement on these ruder weapons; but for a long time it was inferior to the English bow in range, accuracy, quickness, and convenience.

Markham, in his "Soldier's Accidence" (1625),† says:—

"As touching the postures which belong to the musquet, they are fortie in number, and are to be done:—5 standing, 3 marching, 18 charging, and 14 discharging.

"The postures to be performed in charging (loading) are these‡:—

Cleare your pann.
Prime your pann.
Shut your pann.
Cast off your loose cornes (the loose powder not covered in the pan).
Blow your pann.
Cast about your musquet with both your hands, and trayle your rest.
Open your charges.
Charge your musquet with powder.
Draw out your scoureing sticke (ramrod).
Shorten your sticke.
Ramme in your powder.
Draw out your sticke.
Charge with bullet.
Draw out your sticke.
Shorten your sticke and put it up.
Bring your musquet forward with your left hand.
Hold it up with your right hand, and recover your rest.

"The postures which are to be performed in discharging are these:—

Carrie your rest in your left hand, preparing to give fire.
Sloope your musquet, and let the rest sink.

* Class Book for the School of Musketry, by Col. Wilford, 1860, p. 74. The matchlock now produced, from Mr. Bishop, of Bond-street, is also held under the arm. A gun-barrel, without a lock, fixed on a bludgeon and fired by a piece of lighted peat turf, was used lately in the wild parts of Ireland. (That now on the table was captured by the police in Galway.)

† "The Soldier's Accidence; or, an Introduction into Military Discipline," by Gervaise Markham.

‡ The exercises here described, as well as those which follow in this paper, were performed at the meeting by Sergeants Smith Lockie, and Turner of the Left Highland Company of the London Scottish Volunteers, of which company Mr. MacGregor is Captain.

In the right hand poize your musquet.
In the left hand carrie the musquet, with the rest.
In your right hand take the match, between the second finger and the thumbe.
Hold the match fast, and blow it.
Cocke your match.
Trie your match.
Guard the pann, and blow your match.
Open your pann.
Present your musquet.
Give fire."

The conclusion of this tedious business was as follows:—
"Dismount your musquet, and carrie it with the rest.
Uncocke your match, and put it up between your fingers."

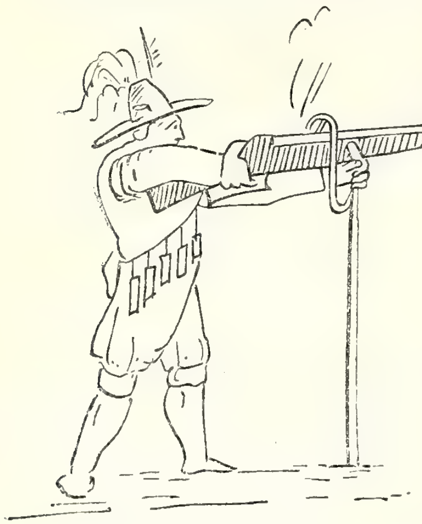


FIG. 3, A.D. 1608.

Fig. 3 shows a musquetaire's position at the command "Give fire," in 1608, where we observe that the butt rests against the shoulder, the right arm is elevated, the left arm steadies the rest, and the left foot is advanced. The whole position resembles that now adopted more than several of those employed between this early period and our own. And even at that time the importance of individual attention in firing, rather than of mere simultaneous volleys, seems to have been recognised better than it was afterwards, for the same author says:—"In teaching to give volleys, the ancient and vulgar manner of discipline (which is, that the whole volley shall be given of all the shot in one battalion or troop at one instant) is utterly to be condemned, which only serves to make a great crack."

An arquebusier of 1632 is represented firing on horseback, by Hewit, in his "Ancient Armour and Weapons in Europe," and several interesting sketches of the use of the matchlock are given in the work on "Military Antiquities," by Francis Grose, who died at the end of last century.

Passing over more than a century, we find the position represented in Fig 4, adopted just one hundred years ago, as that of the front rank when there were three ranks in the formation.* In this it will be seen that the right arm is close to the body, the left arm is extended and off the knee, while the body is not supported by the right heel—a defective position in all these particulars, and yet it was retained until within the last few years.

FIG. 4, A.D. 1759.

After the preparatory caution, "Take care to perform the manual exercise!" the following were the words of command:—

"As front rank make ready!" (Right thumb on cock, step back three feet with right foot, and kneel on right knee, butt on ground, and cock.)

"Present!" (Both arms close to body; right forefinger on trigger.)

"Fire!" (Draw your trigger strongly and at once with the forefinger.)

In the *Scots' Magazine*, for 1776, we read, "Their majesties attended a review of the riflemen yesterday, and were much pleased with the dexterity of the officer, who loaded and fired several times in a minute, and hit the mark each time. He lies upon his back when he discharges his piece." In some cases at present this position is necessary, and with many persons it is found convenient, but the difficulty of loading, and the time and exertion required when skirmishers have to fire as they advance or retire, seem to make this position less desirable than the kneeling one adopted.

The position of lying on the front of the body, and resting the rifle on the rifleman's hat is represented by Ezekiel Baker, 50 years ago, in his "Remarks on Rifle Guns."*

Another illustration shows how the sling can be used to help in steadying the aim while standing, by slipping its loop under the left arm. Various other modes of using the sling to steady the rifle were suggested. One of these was to put the sling, or a ribbon or handkerchief round the neck, and tightened up to the small of the butt. In another the sling was tied to the right foot.

A work called "Scloppetaria,"† published in 1812, recommends for a standing posture that which is sketched in Fig. 5. Here the arms are close to the body. The rifle is supported on the finger and thumb of the left hand, while the other three fingers of that hand keep a strain on the sling. Another plan was to place the ramrod against the hip and underneath the barrel.

The American Chapman, in his "Instruction to Young Marksmen" (New York, 1848), describes a concealed apparatus, called "the Mississippi dodge," "a jointed rest attached to his left arm and under his clothes, which, by a simple movement, is made as still as if mesmerised or case hardened."

The improvement effected in the kneeling position at the beginning of the present century is shown in Fig. 6, in which the limbs are placed so as to constitute a frame

* See "A Plan of Discipline for the Use of the Norfolk Militia, in 3 parts. * * * By William Windham, Esq., and the Right Hon. George Lord Viscount Townshend, Lord Lieutenant of Ireland. 2nd edition. Printed for J. Millan, bookseller, near Whitehall, 1768. Dedicated to the Right Hon. the Earl of Shaftesbury, and the other noble lords who have exerted themselves in their respective Counties as Lord-Lieutenants in execution of the Militia Act." In 1806 three ranks were used, the rearmost loading only, and then handing the firelock to the other.

* Baker's rifle had three separate medals from this Society, and was chosen by the ordnance when a competition, invited in 1800, took place between the principal gunmakers, before the 95th regiment was turned into the Rifle Brigade.

† Scloppetaria, or Considerations on the Nature and Use of Rifle barrelled Guns, by a Corporal of Riflemen. London, 1812.

of triangles, which is really the main feature of a rest or steadying apparatus. In this, it will be seen that the

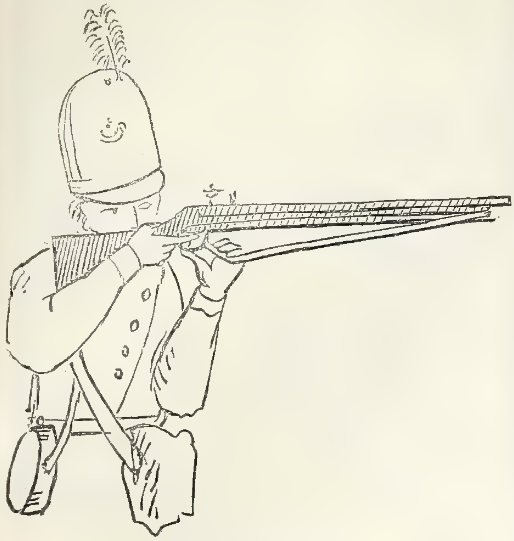


FIG. 5, A.D. 1812.

riflemen, 50 years ago, applied the left elbow to the knee, which was a great improvement on the position of 1759.

FIG. 6, A.D. 1804.

The positions in fig. 7 are those ordered for the French army, as represented in the " Ordonnance du Roi du 22 Juillet, 1845, sur l'exercice et les manœuvres des bataillons de Chasseurs à pied." (Paris, 1852.)

In the standing position, the right arm is raised, the left hand is quite close to the trigger-guard, the feet are in the direction of " right face," with the heels separated.

The American position, as described by Chapman, was the same in 1848 as the French, except that the left arm was more extended, as in the English plan.

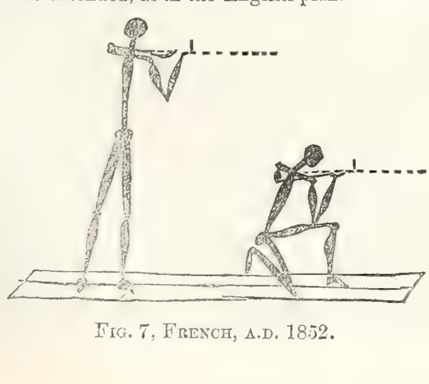


FIG. 7, FRENCH, A.D. 1852.

In the French kneeling position (Fig. 7), it will be observed that the left elbow is in rear of the knee, and the hand is bent inwards, almost as in that shown from Scloppetaria.

Such are some of the various attitudes in which men have hitherto made use of fire-arms. Before we describe the Hythe positions it is necessary to say a few words on the use of the artificial rest which was common with the olden fire-arms. The Swiss still encourage the practice, the Tyrolese use the shoulder of a comrade as a rest, which is both natural and artificial. The folowing just remarks were written in Scloppetaria 50 years ago:—" It is too much the plan among volunteer rifle corps to begin with practising the men from the rest and not from the shoulder, which seems like beginning at the wrong end."

In the target practice of the French tirailleurs they fire two from shoulder and one from rest. In the British army one round at each of the four distances in preliminary firing is directed to be fired from a rest. This is to give confidence to the recruit. An artificial rest is, however, necessary for sighting a rifle, as well as to practice the rifleman in a mode of firing he has frequently to adopt in actual warfare. The portable rest now exhibited was invented by Lord Elcho, and is much approved. The Hythe positions are, in fact, devices to use the body as a " rest," portable, steady, and ever at service. The rest shown by Mr. Lancaster was used for firing one of his rifles at 4,500 yards (more than two miles and a half). In this position the foresight is on a bar pendent from the muzzle. The fixed rest is used for firing a rifle when it is required to be kept perfectly steady.

Fig. 8 (next page) represents the standing and kneeling postures according to the regulations now in force for the British Army. The excellence of these positions is made plain by comparing them with any others, bearing in mind that the position of a soldier must be steady, and convenient for loading and firing in close order, and in skirmishing.

In the standing position, the left foot points straight to the front. The whole body is thus free to sway backwards on the left ankle joint when the recoil takes place, and thus the barrel recedes in a circle of the largest radius. The right foot points to the right at right angles with the left. The long Enfield rifle appears to balance on the left hand at just that distance from the butt where a man, 5 feet 10 inches in height, and with average breadth of shoulder, finds his left hand can hold the rifle so as to be most steady.*

The right arm is raised to make the shoulder a convenient bed for the butt, while the right hand is placed so as to keep its muscles free to put the fore-finger on the trigger, and to obey the mandate from the brain, by which the trigger is slowly but certainly squeezed into action.

In the Hythe kneeling position, the body is supported on three points almost equidistant. The recoil is again made to thrust the body truly to the rear, turning on the left ankle, and thus keeping the barrel nearly horizontal. The right foot, which ought to wear a thick, stiff boot, supports the body as a seat. The left hand balances the rifle, and a hollow in the bent elbow comfortably fits the front of the raised knee-joint. The right hand is free as before.

In both these positions a slight stoop of the head enables the eye to align the sights and the bull's-eye, and at the same time to see that the sights are themselves vertical.†

* Several different lengths of butts are being prepared for issue to the army, so as to remedy the present mistake of endeavouring to get tall and short men to shoot equally well with the same stock.

† The back-sight in the long Enfield rifle is acknowledged to be too near the eye, but this awkward position is in part due to the necessity for keeping the flap out of the way of the hand in trailing arms. The notches of the flap and slides are capable of improvement by bevelling them off with a file. The importance of keeping the centre of the notch vertically over the line

The establishment at Hythe was formed in 1853, to teach the army how to use the rifle in the positions we have described. The school and barracks are situated on

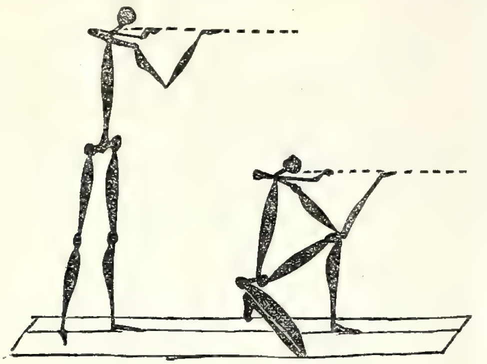


FIG. 8. HYTHE, A.D. 1861.

a rising ground, about a mile from the sea, and overlooking a gravelly plain, which was used even in olden times for training in the art of war.

All discerning persons who have to do with the Hythe School of Musketry, must acknowledge that the personal qualifications of the Officers and Staff are as excellent as the system they adopt and the arm they teach us to use. Major-Gen. Hay combines all the qualities requisite for so important a command. The enthusiasm of Col. Wilford is soon imparted to those who attend his instructions. The other officers have been selected with similar aptitude for their duties, and they are assisted by the sergeant instructors with cheerful and persevering energy.

The Staff of the School of Musketry consists of the Supervising Branch, including the Inspector-General of Musketry and Commandant, a Captain and Deputy-Assistant, Adjutant-General, two Sergeants as clerks, all at Hythe; besides nine Captains and Inspectors of musketry, distributed at home and in the colonies, to superintend the training of the troops.

There are also, at the head-quarters, a Major Assistant Commandant and Chief Instructor, two Captain Instructors, two Lieutenant Assistant Instructors, an Adjutant and Quarter-master, a Paymaster, a Surgeon, and an Armourer (civilian). A Sergeant-major, a Quarter-master Sergeant, nine first-class Serjeant instructors, an orderly-room Clerk, a Paymaster's Clerk, an Hospital Sergeant, a Corporal, and 18 privates; besides 36 second-class and 36 third-class Sergeant Instructors distributed to depôt battalions, &c., for the training of the recruits belonging thereto. The largest number instructed in any one year, at Hythe, was 202 officers, 492 sergeants, 478 corporals and privates, and 182 volunteers.

The staff and accommodation at Hythe are sufficient to enable 60 officers aud 320 non-commissioned officers and privates, or about 400 men, to be instructed at one time. The total expense (per estimate) for the annual maintenance of the above is £12,138 19s. 8d.

Besides the manifest advantage which the army and navy, the militia, the yeomanry, and the volunteers, derive fron this normal School of Musketry, there is a positive economy in the employment of the Hythe system for teaching soldiers to shoot before they begin actual firing; so that the sum spent on Hythe, with the £7,000 voted for rewards and prizes for shooting in the army, about £20,000 in all, will be found a moderate expenditure, compared with that on the old plan, where thousands of tons of powder and ball were thrown away in aimless practice.

Although the instruction is nearly the same in kind for all who go through a course at Hythe, yet the amount imparted depends on the time devoted by the pupil, and the purpose for which he comes to the School.

There is a "long course," occupying ten weeks, in which officers can be thoroughly instructed so as to teach whole battalions when they leave. Again, young officers and recruits, for their own individual practice, are now always compelled to attend about 50 lessons and drills, and 30 preliminary firing practices, in their several corps, while each drilled soldier has to attend about half as many every year before the regular annual course of musketry.

The advantage of the course at Hythe has been lately extended to the Volunteers of Great Britain, and they have accepted with alacrity and encouraging results this most important opportunity of learning how to shoot. Seven bodies of Volunteers have availed themselves of the course, by which 100 members of different corps can be taught at once, and the whole of the instruction and firing is finished in 14 days.

It is understood that there are now names entered on the list of expectants which would fill up the classes for the next three years. The necessity for another school of musketry similar to that of Hythe, but situated in the North of England, has been increased by the eager manner in which the volunteers have thus come forward, and it is likely soon to be met by the inauguration of a northern branch. On this occasion I cannot refrain from suggesting to the National Rifle Association that they should seriously consider whether their assistance, advice, and even supervision might not be extended to the instruction of volunteers in musketry as well as to the rewarding of good shots.

The instruction is given to volunteers without any fee or payment whatever, but with the sanction of the Commander-in-Chief a "Volunteers' Musketry Fund" has just been established for the benefit of the staff-serjeants and others at Hythe, and to which volunteers under instruction there are invited to subscribe 10s. each. The trustees of this fund are the Inspector-General of Volunteers, the Inspector-General of Musketry, and Lords Grosvenor, Elcho, and Bury.

The whole of the arrangements for instructing Volunteers at Hythe are so well planned, and so practically administered, as to make the course an excellent combination of duty and pleasure, in which time is economised to the utmost, and military discipline is observed, while the independent spirit of the new service is fostered. The wisdom and tact displayed by the authorities in this matter make the remembrance of his musketry course grateful to every volunteer. The pride we feel in being

of fire is not fully realised by a beginner. The Americans sometimes allow for the action of a side-wind by inclining the sight to one side. A discussion was continued for several days at the mess of a Rifle regiment, some years ago, on the question whether inclining the sight to the right would deflect the ball to the right or left. The twist in the grooves of a rifle has a tendency to turn the barrel on its axis when it is fired, and this depends on the weight of the ball and the velocity with which it is caused to rotate. This angular velocity varies in different rifles. It is stated to be 453 turns in a second in the Swiss Federal rifle, 422 in the Jacobs, about 600 in the American, with a gaining twist, and 900 in the Whitworth. If the Enfield ball has an initial velocity of 1,300 feet in a second, it would start turning 200 times on its axis in a second. It is understood that in the last Chinese expedition, many men neglected to adjust their sights when firing. Instruction in firing without elevating the sight forms part of the military teaching. In Cooper's "Practical Guide for the Light Infantry Officer," a target is described with three broad horizontal bars across it at equal intervals. The soldier is told to aim at the lowest of these when firing at from 100 to 200 yards, and at the highest of them when firing at 300 yards. The purpose of this is to accustom the soldier to aim always along the barrel, but at different points on the object, according to the distance. A sight for lateral adjustment in case of wind is exhibited by Mr. Lancaster. Several "sight-guards" are before the public. One is by Messrs. Silver, of Cornhill, and is made of ebonite. Another, patented by Captain Jacques, of Manchester, can be speedily adjusted so as to allow the sight to be used in firing.

thus treated by the army enhances the esteem with which every Englishman regards that noble profession, and as an earnest volunteer myself, I venture here to tender cordial thanks to those who devised the scheme for our instruction, and to those who have carried it out with such energy and spirit.

The method of instruction at Hythe consists in teaching the limbs by "position drill," which is carried on in the barrack-yard, while the eye is taught by aiming and judging distance drill, conducted on the sea-shore, and the mind is enlightened by explanatory lectures in suitable rooms fitted up with models and appropriate pictures.

For the physical training, the men are divided into sections of not more than ten each, under one instructor, for it is by individual practice that individual excellence is attained.

The explanations of the construction of the rifle, and of how to clean it, are imparted to squads separately.*

In the lecture room 100 men can be addressed at once, but it is not easy either to describe or to epitomise the mental instruction imparted at Hythe under the title "Theoretical Principles." In explaining the scientific part, the lecturer condenses, or expatiates, skims the surface, or explores the depths, according to the intelligence of his hearers and the time they can devote to the subject. In this manner the best information is imparted in the most lively, popular, and impressive style, on the construction of the rifle; the use, manufacture, and preservation of its several parts; the qualities of powder, and the making of cartridges; the circumstances affecting the explosion of the powder and the flight of the bullet; the proper way to conduct target practice; and the regulations for keeping shooting registers.

While there is no doubt that a man may shoot perfectly well at a fixed mark without knowing any of these matters, it is equally certain that a rational acquaintance with them is of great value in actual warfare, and is always interesting.

The aiming drill, or "eye drill," is conducted by causing the man under instruction to "lay" his rifle on a sandbag in a tripod rest, so as to align the two sights and the bull's eye of a distant target.† The instructor carefully observes the performance, corrects mistakes, and invites the observations and criticisms of the rest of the squad, of whom each in succession aims in the same manner. Two things are notable in this department:—

1. Very few men aim correctly at first.
2. Nearly every man with good sight can speedily learn how to aim correctly.

On the other hand, the ability to "judge distances" correctly is possessed by some persons to a high degree, whereas to acquire it is only possible for a limited number, and after much practice. Men accustomed to a country life, builders, surveyors, artists, and those whose occupation sharpens the eye in this faculty, very readily give excellent guesses at a man's distance, judging from his appearance alone. But for most persons unaccustomed thus to use their eyesight, a series of numerous trials is required.

In my opinion, the few lessons given in this department in the short course for volunteers at Hythe, are scarcely worth the time they employ, except for the system they exemplify, which the volunteers are thus instructed to carry into effect more at leisure in their respective corps.

The "judging distance" drill at Hythe is, however, a most pleasant and interesting part of the course, for it involves many hours' marching in the breezy air of the sea, and over the shingly plain, under the wholesome excitement of competition between the sections, which are directed to march back to the barracks in the order of the merit of their performance during each day.

The eye is practised in judging distance by placing men at intervals of 50 yards, and causing each section to observe the appearance of the face and dress at known intervals, as well as the hue of the background and the state of the atmosphere. After this men are placed at unknown distances, and each pupil is directed to estimate the number of yards. The correct distance* is then declared, and "points" or marks are given to each man in proportion to the accuracy of his estimate.

"Position drill" consists of a series of motions by which the limbs and eye are trained to assume readily the best positions for firing, to remain there steady during fire, and to resume the position for reloading.

The importance of this part of the instruction cannot be exaggerated. The combination of muscles required for holding a rifle in the Hythe positions is not otherwise engaged in the ordinary operations of life, and it is different from those employed by the sportsman.

The exercise of these muscles, therefore, is necessary even to strengthen them, and much more to accustom them and the eye and mind to submit, without flinching, to the loud report, and violent shock, and brilliant flash, all of which are to take place at the exact moment, when perfect steadiness of the rifle is necessary for a good shot. The gentlemen who have kindly attended here this evening to go through this "position-drill" in your presence will exhibit it much better than any description in words.

The "first practice" is purely a gymnastic exercise for the body and limbs, without aiming.

In the second practice the head has a part, the eye takes aim, and the finger presses the trigger.† By aiming at the instructor's eye, the pupil enables him to correct numerous faults.

The third practice is to enable men to load, and fire in the ranks, without disturbing one another.

Over and over this exercise has to be performed, with strict attention to the placing of the feet, the poising of the body, the positions of the arms and head, and that magic sympathy between the rifle sights and the rifleman's eye, trigger, and finger, which shall enable the whole to co-operate when the moment is seized by the brain for discharging the piece. This practice can be carried on even indoors, and without any instructor, yet with the most evident and speedy results in improving the shooting of everyone who devotes himself to its pursuit.‡

The following extract from "Scloppetaria" shows that this private "powderless" practice was not unknown half a century ago:—

"We have heard many old shots say that they have derived great advantage from having their gun in a situation equally easy of access, to which they now and then apply the check and eye as if taking aim, and the consequence was, that when really firing, they felt so much accustomed to the stock and bend that the head went mechanically into the proper position."

After proficiency has been attained in the manner of loading and firing, the teachers introduce the pupil gradually to the use of ball cartridge, first by snapping caps,

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* The importance of cleaning the rifle properly is evident on considering the functions performed by the grooves and "lands" of the barrel, and the delicacy and minuteness of the instrument. Last month General Hay found the mean deviation of an Enfield rifle in 21 shots, at 700 yards, was from 6 to 8 feet when not cleaned, but only 2 feet when cleaned. For first-rate shooting, the Americans clean the rifle after every shot.

† Old Roger Ascham, in "Toxophilos," says, concerning the crossbow, "The having a man's eye always on his marke is the onlye waye to shoote straighte."

* An odometer, for measuring this without the tedious use of the chains, was exhibited from Mr. Newton's, in Fleet-street.

† Col. Wilford says this should be done "as if one had to squeeze one drop from an orange."

‡ Captain Cole's, or Mr. Layton's aiming card targets should be used. The Hythe kneeling position ought to be so practised as to become one of comfort, "in which a man may sit on his heel, shave and read the *Times*." The motto on the medal of the National Rifle Association is, "Sit perpetuum."

and then by firing blank cartridge. Baker, for a similar purpose, recommends sportsmen to fire at birds at first without shot.

After this, 20 rounds are fired by the recruit as preliminary ball practice, and then he is brought to the target for his regular class shooting, which is to be the test of the manner in which he has profited by the foregoing instruction. This preliminary ball practice does not form part of the course for the Volunteers, and, therefore, while time is gained, a very considerable advantage is lost which ought not to be forgotten when comparing the scores made by Volunteers and by the "Regulars" at Hythe. On the other hand, when soldiers are caused to fire with their bayonets fixed there is certainly a disadvantage, though it may be good practice for actual warfare. If the rifleman, who seldom fixes bayonets, is to shoot accurately without a bayonet, it seems quite clear that the position drill ought not to be conducted with the fixed bayonet.

Each section of ten men is taken separately to fire at the targets, and each man fires in succession, with every provision for his individual comfort and success. This actual practice at the target is not so much for instruction as to test, and therefore the instructors, at this point, cease to give minute directions, but leave the faults hitherto uncorrected to be spoken of at some less exciting period.* Each man fires only five rounds at each of two ranges, or ten rounds in one day, by which excellent arrangement both hurry and carelessness are prevented. As there are 12 distances, or ranges, it requires six days to go through the "individual practice." After this there are still three days for file, volley,† and skirmishing practice. So that in all at least 90 rounds of ball cartridge are expended in improving and testing the shooting of each man instructed. This, with 20 preliminary rounds, instead of those in the third period, 20 of blank cartridge, and 20 caps "snapped," constitute the whole of the ammunition consumed for a soldier recruit's course of musketry.

The most accurate register is made of the effect of each shot fired by every man, and the relative merits are estimated by strict but arbitrary rules‡ which regulate the length of ranges, the sizes and shapes of targets, and of the circles on them; the number of "points" for hits on the "bulls'-eye," "centre," or "outer" parts, as well as the number of shots to be fired in individual, file, volley, and skirmishing practice; also the marks for guesses in

* The diagram exhibited by Mr. Lancaster represents a simple plan for marking at the target. A second target is placed so near the mantelet that the marker can point to the exact spot on that which the ball has struck on the real target. This seems to supply an excellent means for speedily ascertaining the direction of error in shooting.

† The archers, in the time of Edward VI., were exercised in volley firing, but troops were not afterwards thus practised until our day.

‡ These are clearly set forth in a little shilling volume, called "Regulations for conducting the Musketry Instruction of the Army." (Feb. 1859. Allen. 1s.) The following are some of the most important of these, so far as they affect our subject:—"Ten caps are snapped standing, and the same number kneeling, by each recruit, and a like number of rounds of blank cartridge are fired. The targets are to be fixed, six feet in height and two in breadth, constructed of iron of sufficient thickness to be rifle-bullet proof, having squares of six inches cut on the face of them, to facilitate the marking off of the hits in the diagrams provided for the purpose, as also circular rings of eight inches and two feet in the centre, to serve as guides in painting the 'bull's-eye' and 'centre.' The shots that strike the target are to be denoted by flags of different colours raised above the butt. These flags, together with the number of points fixed as the value of the shots, are as follows:—

IN THE PRACTICES TO 300 YARDS INCLUSIVE.

Shots.	Flags.	Value in points.
Outer...	... White or Yellow	1
Centre	... Dark Blue	2
Bull's-eye	... Red and White...	3
Ricochet	... Red flag waved in front of the butt	R
Miss ...	... ...	0

IN THE PRACTICES AT DISTANCES BEYOND 300 YARDS.

Shots.	Flags.	Value in points.
Outer...	... White or Yellow	1
Centre	... Dark Blue	2
Ricochet	... Red flag waved in front of the butt	R
Miss ...	... ...	0

The number of rounds to be expended at each distance, the distances and number of targets to be fired at by the several classes in individual firing, and the size of the bull's-eye and centre for each class, are as follows:—

THIRD CLASS.

Yards.	Rounds.	
150	... 5	Two targets, having a bull's-eye eight inches in diameter, and a black circle two feet in diameter.
200	... 5	
250	... 5	
300	... 5	

Fifteen points gained in these ranges are necessary for a second-class shot.

SECOND CLASS.

Yards.	Rounds.	
400	... 5	Four targets, having a black centre two feet in diameter.
500	... 5	
550	... 5	
600	... 5	

Twelve points gained in these ranges are necessary for a first-class shot.

FIRST CLASS.

Yards.	Rounds.	
650	... 5	Six targets, having a black centre two feet in diameter.
700	... 5	
800	... 5	
900	... 5	

Seven points gained in these ranges are necessary for a "marksman."

Ten rounds are expended by each man in file firing. The mark for this practice, and also for volley firing, is to consist of eight targets placed close together, having a separate bull's-eye and centre of the dimensions detailed for the third class. The bullets striking the target in this practice will have the same value in points as in the third class.

In volley-firing, ten rounds of ammunition are to be expended by the recruit, as also by the drilled soldiers of every company annually, at four hundred yards, both ranks kneeling. The hits are to be counted as in the second class, bull's eyes being reckoned only as centres; and in this and the skirmishing practice, care is to be taken that the men of the third class, who have not fired beyond 300 yards, adjust their sights to the proper elevation. In skirmishing practice, 10 rounds of ball ammunition are to be expended by the recruit, and also by the drilled soldiers of every company, annually, in skirmishing order, as per "Infantry Manual," advancing and retiring between 400 and 200 yards, each man judging his own distance, and arranging his sight accordingly. Eight targets, each having its bull's eye and centre of the dimensions detailed for the third class, are to be placed with intervals of six paces between them. Every file is to have its own target, and the hits are to be counted as in volley firing, bull's-eyes being only valued as centres. In firing advancing, the men may fire kneeling, rising to load, which may be executed at the halt, running up to the file leaders after returning their ramrods, and capping after giving the word "ready."

In judging distance drill, the value of the men's answers, by points, in the several classes, are as follows:—

THIRD CLASS.

Or when judging distance between 100 and 300 yards......	Within 5 yards	3 points	
	,, 10 ,,	2 ,,	
	,, 15 ,,	1 ,,	

SECOND CLASS.

Or when judging distance between 300 and 600 yards......	Within 20 yards	2 points
	,, 30 ,,	1 ,,

FIRST CLASS.

Or when judging distance between 600 and 900 yards......	Within 30 yards	2 points
	,, 40 ,,	1 ,,

Firing without using the Back-sight.—After the annual course of target practice has been gone through, the first and second-class men (if there is any spare ammunition) should be trained to fire at 300 and 400 yards with the flat of the back-sight down, judging for themselves the proper elevation of their rifles."

judging distance, and all the minute details involved in a methodical system. Each man who has fired is then ranked as first, second, or third class, according to precise rules, and the comparative shooting of sections, companies, or regiments, in standing, file, volley, and skirmishing positions, is represented by a "figure of merit."

The foregoing description of the Hythe system, and of the establishment maintained for its application, will not be complete without a brief account of the results.

The method has not yet been in operation long enough to enable us to regard the improved shooting in the army as the measure of its benefits, and we must for the present be content to observe what Hythe has done upon small numbers, as well as in short times. The new arm and the new teaching come to us together, and to appreciate rightly their united advantage, we must recollect what was the weapon, and what was the shooting with it, under olden systems.

The degree of accuracy with which a fire-arm shoots at a certain range may be estimated by firing say 1,000 rounds from a fixed rest, and reckoning either the number of hits within a circle of a certain size, or the mean deviation of all the hits from a centre.

The comparison of these criteria with similar figures when the piece is fired by a man without an artificial rest, would, of course, exhibit the shooting powers of the man as well as those of the fire-arm.

Passing over the days of arquebus and matchlock, we find that old Brown Bess was a very inaccurate arm, and that most of those who used it were very bad shots.

After experiments at Chatham, in 1846, with the musket, it was stated, that at 200 yards half the number of shots (from a rest) missed the target, 11 feet 6 inches wide. (Wilford, p. 80.) At the longer range of 300 yards, it is said, 50 years ago, in "Scloppetaria," that in the hands of a good shot "from a musket, not one shot in 300 would, if fired at a single man, take effect." And Col. Wilford thus writes, (p. 81:)—"It has been stated that the probability of hitting one man with a musket ball at 500 yards would be as one farthing to the National Debt. On a recent occasion, at the Cape, 80,000 rounds were fired to kill 25 men. To put a man *hors de combat* requires his weight in lead, and 6 times his weight in iron." Three miles of target were fired at in Russia and not one shot hit the target.

And with respect also to the rifles used in the army, Baker who made them, for the Rifle Brigade, says, in 1825, "I have found 200 yards the greatest range I could fire to any certainty. At 300 yards I have fired very well at times, when the wind has been calm. At 400 yards and at 500 yards I have frequently fired and have sometimes struck the object, though I have found it to vary much."

The author of "Scloppetaria" states that, at 300 yards, firing with a rifle at a single man, one shot in five would tell, "but more likely in skilful hands one in three is a fair average."

Baker gives, as a frontispiece to his book, a six-inch target, used December 11, 1805, when George the Fourth (then Prince of Wales) fired three consecutive shots through the same hole, at 12 yards distance, with one of Baker's rifles. With the same weapon, it was thought splendid shooting to fire, from a rest, 24 consecutive shots at 200 yards, and 34 shots at 100 yards, into a target shaped like a man, six feet high.

A few years later, 12 successive shots were fired (from a rest) into an 18-inch target, at 250 yards, with Moore's rifle.

Chapman, in his "Instructions to Young Marksmen," says, "A first-rate American rifle, with telescopic sights and rest, will throw all its shots into a circle 1½-inches diameter, at 220 yards, and into a circle 8 inches diameter, at 440 yards;" also, that the accuracy of the very best American rifle, "of the old school," in 1840, is to that of a good rifle, in 1848, as 2 to 5.

To secure this extraordinary perfection (where 10 consecutive shots, at 220 yards, are lodged in a small sized playing card), the rifle has "globe and bead sights," a false or "loading muzzle," placed on the usual muzzle, and a "starter," to secure the position of the ball; the linen patches are moistened and not greased, and the barrel is carefully wiped out and dried after each shot.

From Chapman's book* we learn that with a good American rifle in a favourable time, the performances of a fair marksman with and without a rest would be in the following relations:—

Shooting with a rest is to shooting without a rest

At 110	yards	as	2	to	1.
220	,,		2	,,	1
330	,,		16	,,	9
440	,,		11	,,	9
550	,,		30	,,	23

In contrast with the musket and old rifle, we have now to deal with the weapon from Enfield, which has a mean deviation at 500 yards of from 2 to 3 feet.†

And if we could on a considerable scale compare what was done with this weapon by the same men before and after they had been instructed on the Hythe system, the benefit of that teaching would of course be distinctly apparent. As this is not possible, it must suffice to notice a few instances of general results.

In June, 1855, a squad of thirty-five soldiers, after Hythe-teaching with the Enfield rifle, fired at two lines of targets, representing the front and rear companies (30 files in each) of a column fifty yards deep. The men were exercised in marching and other drill, so as to disturb their steadiness. The wind was violent. Each man fired ten rounds, at distances unknown at the time, from 550 to 820 yards, and the result was, that 379 hits were made in the first line of targets, and 238 in the second line. The lines being so placed that no bullet could hit both of them, it follows that out of 1,050 shots fired there were 617 hits, or 58 per cent.

This, it may be said, was not in the heat of battle, but Col. Wilford relates how, in General Wyndham's action, at Cawnpore, a company was pressed by some Sowars, say 70 of them. The Infantry gave them a volley—69 fell in an instant—the remaining man was also shot down at 300 yards.‡

The same officer states, "If at 900 yards you lay down a table-cloth fifty yards square, I would engage with a company of taught soldiers to fill it with balls," and a regiment of 700 men, firing three times in a minute, would in five minutes pour in 10,000 balls.

A general idea may be given of the shooting proficiency ofthe army by the "figure of merit" of the various corps.

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* In America they use wooden targets, 18 inches square, at 110 yards; 24 inches at 165 yards; 36 inches at 220 yards; 48 inches at 330 yards; and 72 inches square at 550 yards. The bull's eye at 220 yards is 7 inches wide, and at 550 yards it is 18 inches wide. To indicate the wind, there are streamers or flags, two inches broad and 6 feet long, on posts 7 feet high, at every 60 yards.

† The earth's rotation of course affects the deviation of a ball fired along a meridian. At a rough calculation, if we fire in this manner (about our latitude), and with a bullet traversing a mile and a half in three seconds, there would be a deviation due to the earth's rotation of about six feet. The mean deviation of the government powder must also be taken into account. Powder for cartridges is rejected at Woolwich unless the mean deviation is under 4 feet, and it is usually from 2 to 3 feet. The powder for 1861, just served out, is very strong and clean.

‡ See "A Volunteer's Narrative of the Hythe Course," by Mr. Edwards, of the 5th Norfolk Volunteers,—an interesting pamphlet.

This criterion is the sum of the averages of points gained in the "first period," and in the file, volley, and skirmishing practice. From the return dated last January, of the "figure of merit" for 1860-1, of the several corps and battalions in the United Kingdom and North America that had gone through their practice, we perceive that there are 75 different regiments or bodies enumerated, and the following are a few instances are selected from this list:—

Corps.	Figure of Merit.	1st.-class men	1st.-class in judging distance.
No. 1. 47th Regiment . .	48·24	47	99
,, 2. Scots Fusileer Guards, 2nd Battalion .	45·61	34	85
,, 3. Grenadier Guards, 3rd Battalion . .	45·46	52	93
(The next 23 have a figure of merit not below 40.)			
,, 29. The 60th Rifles, 4th Battalion . .	39·74	16	89
,, 36. Royal Engineers . .	38·24	30	76
,, 39. Rifle Brigade, 1st Battalion . . .	37·01	15	74
(There are Five Corps with a figure below 30.)			
,, 75. Royal Newfoundland Companies . .	26·97	5	64

The Duke of Cambridge, with reference to this return, expresses his desire to see every regiment attain a figure of merit of at least 40.

The following table is useful as a standard (no doubt a high one) whereby to compare the averages and figures of merit of the various corps.

AVERAGE AND PER-CENTAGE FOR 1858–9, AT HYTHE.

DISTANCE.	Average Points per Man.	Per centage of hits to rounds fired.
*150 yards . .	5.94	85·01
*200 ,, ...	4·80	72·04
*250 ,, ...	3·72	59·03
*300 ,, ...	3.25	54·25
400 ,, ...	3·44	61·21
500 ,, ...	2·67	48·69
550 ,, ...	2.07	41·88
600 ,, ...	2·21	40·26
650 ,, ...	2·31	40·46
700 ,, ...	2·26	40·77
800 ,, ...	1·39	24·34
900 ,, ...	·75	13·95
1st Period . . .	18·36	
File Firing . .	10·74	80·81†
Volley Firing . .	9·89	76·22
Skirmishing . .	5·46	39·00
Total or Figure of Merit.	44·45	

It is interesting also to compare the shooting of the Volunteers and of the soldiers instructed at Hythe, although the "figure of merit" is, of course, improved in the case of soldiers by their previous platoon drill, especially in the file, volley, and skirmishing practice.

* The averages at these distances include every shot fired in 1st, 2nd, and 3rd periods, up to 300 yards.

† Misprinted 08·81 in a book sold at Hythe.

By the obliging kindness of Captain McKay, of the School of Musketry, I am enabled to present the following statement:—

	Officers.	Non-com. & Privates.	Volunteers.
Figure of Merit of each party, of detachments, and class of officers and volunteers, since the present system of practice came into operation, to 30th April, 1861, at Hythe	46·08	43·97	...
	46·94	44·35	...
	45·62	42·62	47·07
	42·53	42·54	43·29
	41·44	38·07	45·00
	46·71	42·07	47·11
	44·43	44·16	42·59
	45·22	46·31	45·02
	48·98	44·19	46·70
Average of seven parties ...	45.12	42·85	45·25

It is evidently desirable that we should be able to compare men's shooting by some other measure than the "figure of merit," however useful that may be as a rough standard for purely military efficiency.

To afford a convenient and fair criterion, is by no means an easy matter, for in estimating the accuracy of the shooting of a party of men, there are evidently several data which have all to be considered.

Setting aside even the judging of distance, and the file, volley, and skirmishing practice, and supposing the targets, positions, marking, and other rules to be according to Hythe regulations, the proficiency, with a certain rifle and ammunition, will be evidenced by a compound standard, comprising :—

1. The highest scores at each range.

2. The highest scores in each period.

3. The highest scores of individuals.

4. The percentage of marksmen, 1st, 2nd, and 3rd class men.

5. The number of points standing, and numbers of points and of hits kneeling, compared with the totals of "possible scores."

6. The season of year, time of day, state of the weather, direction, force, and nature of wind,* the amount of practice at the same butts, and the position of the targets.

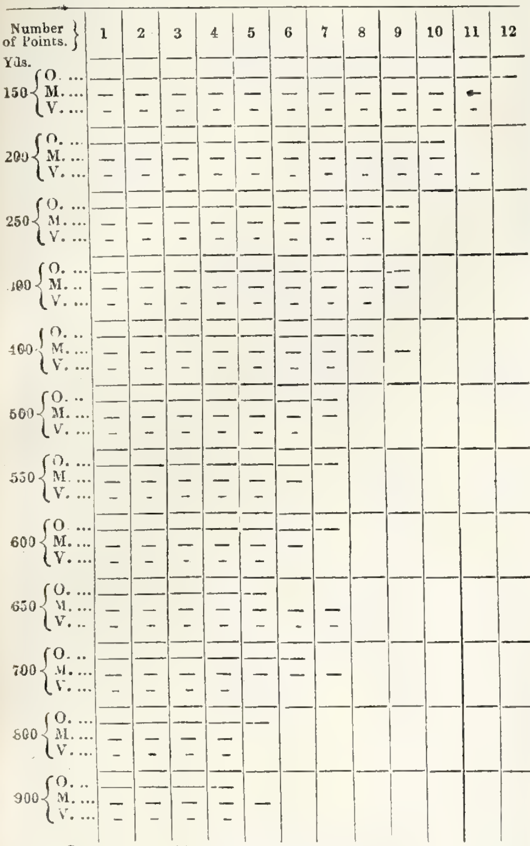
The relative values of some of these data may yet be agreed upon so as to constitute a shooting figure, or "Rifle monogram," for instant significance. Meanwhile, a comparison of the shooting of different bodies or individuals, or of the same at different times, has to be made by stating the foregoing circumstances, separately and without any conventionally established relation among them.

And here let me again insist positively upon the unfairness of applying merely the number of points or of hits as the sole test of shooting, when all the other variable circumstances are neglected.

We might almost as well compare the sailing of two yachts in different rivers or on different days, as the shooting of two men on separate occasions or at different butts, or with different arms. Under this protest, let me call your attention to the following diagrams compiled from information supplied by Captain M'Kay.

* The wind affects the ball in its flight in a manner which can only be estimated by careful experiment. The same cause also affects the steadiness of the rifle as it is being fired, and to obviate this, Lord Elcho has invented the weather screen now produced.

GREATEST NUMBER OF POINTS MADE IN FIVE SHOTS AT THE SEVERAL RANGES AT HYTHE BY INDIVIDUALS BELONGING TO CLASSES OF OFFICERS, OF NON-COMMISSIONED OFFICERS, AND PRIVATES, AND OF VOLUNTEERS, BEFORE DECEMBER, 1860:—



Here the highest score at each range is indicated by the unbroken line (Officers); broken line (Non-Commissioned Officers and Men); and line of – (Volunteers).

The two Volunteer courses of December, 1860, and April, 1861, are not reckoned in the above.

In the course, 1861, twelve points were made at 150 yards, eight at 400 yards, seven at 500 yards, and five at 700 yards.

In that of December, 1860, nine points were made at 300 yards, seven at 550, and five at 900.

I am not aware that the recent military course made any improvement on the figures in the table.

If these additions be made to the table, it appears that the maximum score at any range of the officers, men, and volunteers, was equal at 300 and at 500 yards.

The officers beat the men at 150, 550, and 800 yards.

The men beat the officers at 400, 650, 700, and 900 yds.

The officers beat the Volunteers at 250, 600, 700, and 800 yards.

The Volunteers beat the officers at 200, and 900 yards.

The men beat the Volunteers at 250, 400, 600, 650, and 700 yards.

The Volunteers beat the men at 150, 200, and 550 yds.

On the whole, the men beat the officers by one range, and the officers beat the Volunteers by two ranges, out of twelve ranges. The Volunteers beat both officers and men at the short range of 200 yards, which is that selected for the National Rifle Association Meeting of 1861.

The Wimbledon meeting of 1860 was under circumstances totally different from the practice course at Hythe, and it would, therefore, be very fallacious to compare the shooting at Hythe and at Wimbledon.

It may be mentioned, however, that in the shooting for the Whitworth rifles, when 299 competitors contended, the maximum scores in five rounds, at the three ranges, were as follows:—9 points at 300 yards; 7 at 500 yards; 6 at 600 yards. All the scores at Hythe and Wimbledon, even the best of them, have been frequently surpassed in different parts of England and Scotland, but it is obviously beyond the limits of this paper to give an account of the shooting in general, either of the volunteers, of private individuals, or of the army.

When we consider, however, that there are 691 officers of the army who are certified as first-class instructors of musketry, and 194 as second class, about 900 in all (besides the non-commissioned officers and men), and that not 500 volunteers have passed through the short Hythe course, it is remarkable that the average figure of merit of the volunteers exceeds that of the army, while the number of maximum points at ranges falls very little short of the corresponding criterion of the military courses.

A generous rivalry in target practice between the two services will, no doubt, improve the shooting of both.*

The following table shows the number of points made at the kneeling ranges by the best shots as prizemen, at Hythe, in the seven courses of Volunteers:—

		Second Class.	First Class.	Total.
Sergt. Hoare, 9th Gloucester (6th Course).	points	18	18	36
	hits...	13	14	27
Capt. Mac Gregor, London Scottish (6th Course).	points	16	15	31
	hits...	15	13	28
Capt. Fordyce,† 5th Aberdeenshire (7th Course).	points	22	8	30
	hits...	17	7	24
Mr. Fielder, 8th Middlesex (2nd Course).	points	16	13	29
Lieut. Muir, 3rd Peebleshire (7th Course).	points	16	12	28
	hits...	16	11	27
Mr. Coulborn, 11th Lancashire (3rd Course).	points	16	11	27
Lord Fielding, 4th Kent (5th Course).	points	12	14	26
Mr. Warren, Oxford University (1st Course).	points	13	11	24
Mr. Wells, 23rd Kent (4th Course).	points	14	10	24

The highest score made in the 1st class alone was that by Mr. Hoare, recorded above. The highest in the 2nd class alone was 21 points, by Captain Pipon, of the 7th Sussex. The highest score made in the 3rd class was 36, by Ensign Oxley, 4th Surrey, 7th course.

The foregoing sketch of the rifle instruction at Hythe is presented with diffidence, as by no means a sufficient description of that admirable institution. The subject courts examination, for the rifle is becoming every day more interesting to Englishmen, more powerful to defend their homes, more formidable to deter their enemies.

The bravery of the army has never failed us, but with this new weapon it is more than ever strong. The navy cased in steel has a hailstorm of iron ready for our foes. At a modest distance, but with rapid strides, the volunteers

* A match took place on April 20 between a company of the 78th Highlanders and the 3rd Midlothian volunteers, when 12 of the Highlanders, at 200 and 250 yards, 5 rounds at each, made 122 points, and 12 of the volunteers made 127 points. The Harrow School-boys make good shots. One scored 17 in the 2nd class, another 30 in the 3rd class, lately.

† Captain Vernon (18th Worcester) scored (2nd class) 18, and (1st class) 14, total 32; but he was disqualified for the prize, having inadvertently used a rifle found afterwards to have a trigger too light in the pull.

are pressing on. With these three, each at their post, old England is well defended.

Relying on God's help, we shall fight for justice, freedom, and peace, and woe be to the rash invader that sets foot on British ground.

DISCUSSION.

The Chairman said it was now his duty to invite gentlemen present to offer their remarks upon the interesting paper they had heard from Captain MacGregor, and to discuss generally the question which had been brought before them, viz., the system of instruction given at the School of Musketry at Hythe.

Mr. Thomas Scott said, with the permission of the Society he had placed on the table a regulation Enfield rifle, with a new trigger, which realised, in a way that had never been done before, one of the most essential points inculcated in the admirable course of instruction at Hythe, namely, "squeeze off the trigger," so that the aim taken might not be disturbed by the act of firing. Colonel Wilford had embodied this point in one of his many happy expressions, as Captain MacGregor had stated, "let this squeeze be applied as if extracting the last drop from an orange." Now, with the present form of trigger, and a minimum pull of 6lbs., this was literally impossible, although they were all aware that the nearer it was approximated the better the shooting. Although all the gentlemen present might not have had the advantage which Captain MacGregor and himself had had, of undergoing a course of instruction at Hythe, yet so many volunteers had now been there, and in their turn had imparted these instructions to their respective corps and companies, that he presumed the Hythe principles and positions were pretty generally understood. And he would put it to those so informed, if it was possible for all men with different lengths of arms, and differing in other respects, to assume those positions and carry out those principles (although the best yet known) with regulation rifles of an uniform pattern. As the clothes were fitted to every individual soldier, so it appeared to him ought the more important part of his equipment—his rifle—to be. When a short-armed man took his aim with the present Enfield, and then attempted to lay hold of the trigger, away went his aim to the left; then when he fired he pulled it back again, and away went his shot to the right, or perhaps he made a ricochet. But the rifle he (Mr. Scott) produced required no pull, being fired by simple pressure from the finger, which was directly counteracted by the thumb. By adopting a mean point for the trigger, any length of arm could be accommodated, but it would probably be better to vary this point and adopt two or three different distances from the butt, so that by this arrangement the regulation rifle, unaltered in all its other parts, might be adapted to long, medium, or short-armed men. The simplicity of this trigger was also so great, that in superseding the common trigger and trigger guard, about sixteen of the twenty-six operations involved in making them were saved. The stock was also strengthened, as no part of it required, as at present, to be cut away, and the projection he (Mr. Scott) had adopted, enabled the rifle to be carried at "shoulder arms," the same as if supported in the hand by the present trigger guard. But these were mere points of mechanical contrivance and adaptation, and were quite unimportant compared with the principle of the invention, which enabled the left arm to be kept perpendicular in all cases, and the right arm horizontal, forming, firstly, a perfect support for the rifle; secondly, a perfect bed for the butt; and thus enabling anyone to carry out with ease the Hythe instructions in shooting. The pull, or rather pressure, of this new trigger was about six pounds, which was too strong for ordinary fingers, and it was made so to meet General Hay's requirements; but on showing it to General Hay, he said his stipulated minimum of six pounds applied to the common trigger, which was exposed, and thus liable to accidents; whereas this new trigger was not exposed, and might, therefore, be reduced to one-half its present pull. He thought the exhibition of this rifle might be interesting to his brother volunteers and others; and, should it be generally adopted, he was sure it would lead to improved shooting. The best proof he could give of this was, that he yesterday used it for the second time in competition with six marksmen, and six other members of the London Scottish Volunteer Corps, on Wimbledon Common, and although himself an indifferent shot, he made the highest score at every range from 200 to 600 yards, with the exception of that made by the well-known shot, Ensign Dunlop, at one range. He therefore claimed for this trigger the following advantages:—1st, That a correct position can be maintained by men with arms of different lengths. 2nd, That it is less liable to accident. 3rd, That the stock is made stronger. 4th, That it renders the rifle cheaper. 5th, That it possesses greater simplicity than the present rifle, a thing most important to all, but especially to volunteers who could only give a limited time to instruction in its use.

Mr. Phillips (musketry instructor to the West Middlesex Volunteers) begged to inquire whether the noble chairman had heard of the stadium invented by Sergeant Hill, for measuring distances. It had been found of great use in his own corps in their practice in the park. It was an apparatus quite as portable as the triangular rest upon the table; and by its means they were enabled to measure distances with fair accuracy. It avoided the carrying of heavy chains and other apparatus, and effected the object much more readily.

Mr. Young called attention to an electric target, the invention of M. Chevalier, which was exhibited last year at Beaufort House, and might be seen in operation at the present time at Aldershot and Woolwich. It appeared to him the most effective plan of any he had yet seen, inasmuch as, in the 300 yards practice at Woolwich, the part of the target struck by the shot was registered before they heard the sound of the bullet striking the target. Some officers of the Russian Government were so much struck with it that they gave instructions to have the system arranged for targets for common practice. He believed Lord Vernon had had one of these targets fitted up at Liverpool. As far as practical efficiency went, he (Mr. Young) thought it was the best he had seen.

Lord Vernon remarked that he had one of M. Chevalier's targets in operation, which gave great promise of good results. It was, however, in some respects liable to get out of order; but in spite of the mechanical defects to which he had alluded, he must say, in justice to Lieut. Chevalier, that he considered his invention a very valuable one. When he first saw one of these targets he expressed a hope to Lieut. Chevalier that he might one day succeed in making a great improvement in it, which would be that of having a miniature target or dial at the shooting place, on which would be shown at once, and not only shown but marked, the exact position of the shot on the real target.

Mr. W. E. Newton would call the attention of the meeting to a recent invention, brought forward by Captain McNeill, of the Liverpool Artillery Volunteers. It was a target, which in his (Mr. Newton's) opinion answered all the requirements that could be expected from an apparatus of that kind. It consisted of two or three plates of iron, of sufficient thickness to resist the impact of the bullet. The plates were fastened into a wooden frame, and behind the plates were arranged a series of hammers, which were connected with an apparatus which set clock-work in motion, causing a flag to come up so as to indicate what part of the target was struck. This apparatus was constructed upon the well-known principle that if they struck an iron plate with a hammer, and placed a hammer behind it, it caused a rebound from the plate. In this target, the blow of the bullet striking the target caused the hammer behind it to rebound, which produced a mechanical action sufficient to detach a detent, and allow the clock-work to throw up a flag, or some other indicator, which could be seen from

a long distance. It was so contrived that immediately after the indication was given, the flag returned to its former position. As far as he was at present able to judge, it appeared to be a very efficient apparatus for the purpose, and was not liable to get out of order.

Mr. YOUNG added that the plan of hammers had been introduced into the apparatus of M. Chevalier, instead of springs, by which the difficulty of the plate canting from a blow on the side of the target was obviated. This removed an objection which was felt to exist in the first instance.

Captain BRIDGEMAN remarked that with regard to both the targets just spoken of, he did not see how they could distinguish between a good shot and a bad one. A ball might ricochet and yet strike the target so as to be registered by the red flag, whilst a ball which hit the same point would do no more. He thought, by such indefinite modes of indication as these appeared to be, the merits of the shooting could not be displayed.

Mr. WAGSTAFF said the practice of the North American Indians was to fire the rifle from the muscle of the arm, holding the weapon away from the body, so that the aim was not affected by the motion of breathing. The stock of the rifle was made half-moon shaped, which fitted the muscle of the arm. The Hythe principle appeared to be to keep the rifle as close to the body as possible, in which position he apprehended the motion of the chest in the act of breathing would affect the steadiness of the aim.

Mr. THOMAS SCOTT remarked that it was the practice of experienced marksmen to hold the breath during the time of taking aim and firing, which only occupied a few seconds.

Mr. WAGSTAFF apprehended that the operations of sighting and aiming were not momentary. There was this to be said in favour of the rifle, that it did not require to be held with the same amount of stiffness that was necessary when a charge was used that produced considerable recoil.

The CHAIRMAN inquired whether the practice alluded to existed amongst the American Indians at the present time.

Mr. WAGSTAFF replied in the affirmative. The whole of the back-woodsmen used the rifle in that way.

The CHAIRMAN suggested that with the rifle in that position the recoil was liable to inflict injury upon the muscles of the arm.

Mr. WAGSTAFF replied that there was no recoil from those rifles.

Captain MACGREGOR remarked that the American rifles alluded to were three times the weight of those used in this country.

Mr. BLACKIE begged to inquire whether it was customary at Hythe to use the same charge of powder for all distances?

The CHAIRMAN replied that the Government regulation cartridge was used in all cases.

Mr. BLACKIE suggested that, if a bullet took effect at a distance of 1,000 yards, the charge for less than half that distance should be proportionally reduced.

The CHAIRMAN said the simple answer to that proposition was, that when a man loaded his rifle he could not tell whether he would have to fire at the enemy from 200, 500, or 1,000 yards' distance.

Mr. BLACKIE further suggested that charges might be prepared for each distance.

The CHAIRMAN remarked that that would be almost as slow a process as that which Captain MacGregor had described as prevailing in 1605.

Captain PAGE said he had been led to ask the question of Mr. Wagstaff how they were to manage to fire in rank upon the method adopted by the Red Indians. It might answer for separate firing, but he thought it could hardly be adopted as an army position at the Hythe School.

Mr. WILLIAM HAWES thought the discussion upon this paper might be considered as almost closed. The noble chairman had limited the discussion to the subject as it was stated at the head of the paper—viz., on the Hythe School of Musketry Instruction in Rifle Shooting. This meeting having, as he thought, exhausted that subject, he might be allowed to ask what was the object of all this great expense which they had been told attended this school at Hythe, and what was the end to be attained in placing weapons in the hands of men who were to hit 58 per cent. of those whom they fired at, instead of, as in former times, only one shot out of 1,200 striking the enemy. If the object of war was to destroy the enemy in the shortest space of time, it was clear that any system of instruction which would enable them to destroy the enemy with certainty must be an advantage to the country. But if the enemy had in his own hands the same class of weapon as they employed they might find themselves in the position in which they would wish their enemy to be, and might be equally soon destroyed. It therefore resolved itself into the question, how far this country was justified in going to any amount of expense so as to place both men and arms in such a position as that they could be surpassed by none and equalled by few. That was the object which they should endeavour to attain, and if the facts were as stated, and he had no reason to doubt them, they had arrived at a position in which they might safely challenge the world. This remark applied not only to the smaller arms, but also equally to the larger ones; therefore they ought not to be dissatisfied when they saw the large sums that were annually voted from the public purse for the proper arming of the service generally, if they believed that this expense was incurred to place them in advance of every other country in the world, so that when the time arrived—if ever it should—they might maintain the same superiority as they had always maintained over any enemy that could come against them. They could not, as it appeared, enjoy the luxury of a perfect system of defence without incurring great cost. On the one hand, they must sacrifice men—and they were very costly—and it was clear the more rapidly they destroyed an enemy, the fewer men they would lose themselves; or on the other hand they must place themselves in such a position as to possess the preponderance of power in their own hands to destroy more of the enemy than he could destroy of them. If that were the case any amount of money they might expend upon the volunteer system would be well spent; and would only be increasing the amount at one period to lesson it at another, because the power they thus created would not be easily destroyed, and would always be more effective than a less efficient and a less well-taught power.

Captain MONTGOMERY wished to bring forward a little more prominently one point which had been mentioned by Captain MacGregor in his paper. Amongst so many matters of interest, one which he thought was of special moment was apt to be lost sight of. It was in truth the moral of the paper, whether in fact Hythe should not be brought to Wimbledon? He had no doubt this paper would lead to the consideration of this question in the proper quarters. The large number of volunteers who had entered themselves for instruction at Hythe showed how inadequate that establishment was by itself to meet the requirements of the volûnteers in addition to those of the regular army, and he thought it very desirable that some other similar establishment should be placed upon a proper footing which would give those advantages to the volunteer body which Hythe certainly did to the regular army. He hoped the suggestion would not be lost sight of, but that it would bear fruit before long.

The CHAIRMAN said, whether he agreed with or ventured to differ from any of the remarks which had been made, they would all agree that they were very much indebted to Captain MacGregor for the interesting paper he had read to them. He knew more of Captain MacGregor than most present, for he was an officer in the noble corps which he (Lord Elcho) was proud to command; and he would say there was not a better soldier, a better

officer, or a better man in any way than Captain MacGregor. That was known and fully appreciated in the London Scottish, as well as by all who had the pleasure of his acquaintance. Captain MacGregor was a soldier " to the manner born," for, although a lawyer, he had taken up soldiering with great ardour. He had thought it his duty to come forward, as so many thousands had done, and become a volunteer, and he had thrown himself heartily into the cause. He (the chairman) did not believe there was a better shot, because, though Captain Hoare was first class, as gaining the highest number of points at the longest distance, the best shot in the next distance was Captain MacGregor, of the London Scottish, for which he was awarded a prize rifle, a trophy which his comrades were extremely proud of. Captain MacGregor had given them a most interesting history of the training which soldiers had gone through from various early periods in this and in other countries. He had shown them that strange looking thing like a huge firework at the end of a stick, and also the carbine which was carried by the cavalry soldier at the period of 1495. At the present day a discussion was going on as to the mode in which the carbine could be most conveniently carried, and what description of weapon it should be. There was much complaint of the inconvenience of carrying the carbine. He should like to know what they would say if they had to go out with the carbine of 1495! In addition to the arms used, the paper had treated at some length of the mode of instruction in the use of the arms. They had seen a good illustration of the system of training and instruction for musketry practice in vogue in the year 1695, as exhibited that evening by Sergeant Smith, of the London Scottish. It struck him that there must have been a considerable difference between the volunteers of that day, if they then existed, and those of the present time. At the present day there were a great number of competitors for the position of officers, a great many wished to be sergeants, but if, instead of the comparatively simple drill of the present day, they had to go through the 40 positions for platoon exercise as in 1625, there would hardly, he thought, be so eager a desire for promotion as now existed. But one might predict—as he had no doubt the London Scottish would exist for many centuries to come—if in the year 1961 a Captain MacGregor — no doubt a direct lineal descendent of his gallant friend on his right—if there should be a Captain MacGregor of that day giving a lecture on the musketry-practice of 1961, and the positions which riflemen had to assume, he would contrast the drill of the present day with the drill of 1961; and he was much mistaken if, instead of all they had now to go through, there was not some system much more simple. He held in his hand the breech-loading rifle of the present day. Having exhibited the rapid method of loading Westley Richards' breech-loading rifle, his lordship went on remark, that though he did not pretend to enter upon the question of the comparative merits of different descriptions of arms, yet he should not be surprised if in this generation they saw the breech-loader more generally adopted. Some years ago an order had been issued for the supply of several thousands of that description of weapon to the army, for the purpose of experiment as to the action of wear and tear in different climates—for England's empire was in every climate of the globe. He had no doubt the drill might be simplified; but Capt. MacGregor had deservedly praised the system of instruction at present practised at Hythe. Captain MacGregor was, in himself, an instance of the excellence of that system of instruction, for, if he mistook not, Captain MacGregor, before he became a Volunteer, was not a rifleman; but he went to Hythe, and after a fortnight's instruction, he was the winner of almost the first prize there. That showed the great merit of the Hythe system. They found there congregated, men who had been accustomed to shooting all their lives, and men who never fired a rifle till they went there. When he (the Chairman) went to Hythe, he went as one accustomed to the use of the rifle in deer stalking, and as a sportsman generally, but there were men in the class with him who had never fired a ball before, and after eight or ten day's training, they beat men who had been accustomed to shooting all their lives. The excellence of the instruction at Hythe consisted in a great measure in the positions. At the same time, he thought there were some points in the old system which were extremely good, and which ought not to be despised in the present day. He particularly alluded to the rest which was formed for the arm by a handkerchief suspended round the neck of the marksman, as exhibited by Sergeant Smith. It was a good and firm position. Whilst he accorded his unqualified approbation to the positions taught at Hythe, he, at the same time, thought there were some others which might be included with advantage. There were positions in which it might be necessary to fire up-hill or down-hill, occasionally lying on the back or on the face; and it was desirable that a rifleman should be taught to shoot in every position which he might be called upon to assume in the field. They had heard, no doubt, of the deer-stalker's position, which was the favourite position of Capt. Ross, the champion marksman at the last competition for prizes at Wimbledon. The noble Lord having shown this position, went on to remark that Capt. MacGregor had stated how much the volunteers were indebted to General Hay, but not only were the volunteers indebted to him, but he deserved well of the whole British nation, for the zeal and intelligence he had displayed as the head of the Hythe establishment. He had done this at a time when the volunteer movement was not so popular as it was at the present day, and when the regular army appeared inclined to look upon the volunteers with a feeling other than that of a fraternal kind—when, perhaps, they thought gentlemen were rushing into the movement with more zeal than endurance—when the idea, perhaps, prevailed, that those who had come forward as volunteers would not be inclined to submit to the disagreeable duties of drill. At that time, General Hay had no doubt as to the soundness and permanence of the movement, and he, along with the Duke of Cambridge, had been the means of uniting the army and the volunteers in a way that would be lasting, and which would always operate for the good of the country. With regard to Colonel Wilford, it was one of the greatest treats that could be enjoyed to attend his lectures upon musketry. They were accustomed to hear about the right man in the right place, and that might truly be said of Colonel Wilford. He might remark that he thought perhaps a little too much attention was paid to long range shooting, rather to the neglect, as he thought, of the shorter distances, and he was happy to find that the National Rifle Association had thought it right to alter the " off-shoulder" range this year from 300 yards to 200 yards. That had been done to show that great importance was attached to short range shooting, and that 200 yards was a better off-shoulder-test than 300 yards, and that the great thing was to teach the volunteer that he was to knock over his enemy at 100 or 200 yards as well as at 800 or 1,000 yards. The importance of that step was shown by the mention made that evening of the fact, that in the late Chinese campaign the soldiers were ordered not to raise their sights at distances less than 300 yards. This was brought about, it would seem, by a regiment having fired over the heads of a troop of Tartars at a distance of 80 yards, and it appeared that the shooting of the French soldiers at short distances was better than that of the English. The French rifles had sights only for distances of 100 or 150 yards. He was aware that some people were endeavouring, wrongly, as he thought, to induce the authorities to form *corps d'élite*, but that would never answer for England, for our troops were sent all over the world, and they must be as qualified to act in New Zealand, or the Cape of Good Hope, as in England itself. Therefore it would not do to have *corps d'élite*, as was the case in the French army. Having alluded to the national benefit which was derived

from the annual gatherings for competition in rifle-shooting, and bespeaking the support of the country at large for the National Rifle Association, his lordship proceeded to remark upon some of the inventions which had been brought forward in connection with rifle practice. Mr. Phillips had alluded to the stadium of Sergeant Hills. It was undoubtedly a good invention for determining distances; but he might mention a more simple arrangement which was adopted by deer-stalkers, who lost more game from misjudging distances than from inaccuracy of aim. This consisted in using a specially constructed telescope, with cross hairs, by means of which the distances could be determined within a few yards. They had heard a good deal that evening about various kinds of targets. Mr. Young had referred to the invention of M. Chevalier, than which nothing could be better, as it saved the trouble of marking as well as the danger to the marker, but it was still capable of being improved upon. It was divided into about seven large squares, and the defect in the marking was this—the particular part of the square struck was not indicated, and, as the squares were large, no really correct guide for the marksman was obtained. This he thought was a defect which required to be remedied. He considered there was an advantage over this in the Swiss target, which marked by means of discs. In the practice with the latter target the marker was hidden in a trench, out of harm's way, and by means of a long line, he was able to make indications upon a smaller target similar to the marks made by the ball. The marks were indicated by displaying white or black patches, as the case might be of a hit on the reverse. At the same time, the system of marking was comparatively vague, as they never knew exactly where they hit. What they wanted at the Wimbledon meeting was an apparatus which would enable the public to judge of the merits of the firing, as well as those more immediately interested in the results. It was very desirable, at a high range, and with a long trajectory, to place the marker beyond the reach of accident. Mr. Scott was, he believed, about to introduce something for that purpose, and he would probably allow the first experiments to be made upon himself personally. Mr. Newton had spoken of a target which, by the action of hammers and clock-work, sent up a flag indicating the position of the target struck. But, perhaps, for ingenuity, the targets of Germany excelled all others. If a centre were hit, two or three figures jumped up, but if the bull's-eye were struck, up jumped the figure of a lady, as if in compliment to the marksman's skill, accompanied by the discharge of small cannon and a general conflagration. Another system, or rather a suggestion, was communicated to him a short time since by a gentleman in Edinburgh. This was termed an acoustic target, composed of different kinds of material, which, by the different sounds emitted by the several metals would indicate the part of the target that was struck. The sound of the bullet striking the target could be heard under some circumstances at a distance of 1,000 yards, and in this case it was suggested that the shot should be indicated by the different rings of the metals. He thought there was something in the suggestion, and had accordingly communicated it to General Hay, at Hythe. Up to 500 or 600 yards distance he thought such a target might be found to answer. In conclusion, he would express his satisfaction at seeing the interest which the people of this country were taking in rifle shooting, as was evidenced by what was going on all over the country. Wherever rifle shooting took place, it created a *furore* amongst the competitors. It was difficult to know what they were to prepare for at the next meeting at Wimbledon, when they had before them the fact, that at a prize meeting at Hythe, a short time since, there were no fewer than 180 entrances, at 2s. 6d. each, for a prize of a four-guinea cup. That was the difficulty they laboured under at Wimbledon. That meeting would very shortly come off, and the Association did not know whether they had to prepare for one hundred or for two thousand competitors; and if there were volunteer officers present, he wished to point out to them that he did not think the National Rifle Association was met in this matter by the volunteers as it ought to be. They were anxious to make preparation as far as possible for all comers. In the month of March the Association sent no fewer than 1,280 letters to the different volunteer corps in the kingdom, requesting to be informed as to the probable number of competitors that would be sent from each, but they had only received 200 answers out the 1,280; and yet in the next five weeks they had to prepare for all the volunteers who would come up. Having himself taken a deep interest in the movement, he was gratified to see the general interest it had excited throughout the country, which afforded the best guarantee for the continuance of our national freedom for ever. He begged to propose a cordial vote of thanks to Capt. MacGregor for his paper.

The vote of thanks having been passed,

Capt. MacGregor acknowledged the compliment.

The Paper was illustrated by the following articles among others:—Matchlocks, from Mr. Bishop, of Bond-street; Rests, from Mr. Lancaster, of Bond-street, and Lord Elcho; Scott's Patent Rifle, by Mr. Thomas Scott; Sight Guards from Captain Jacques and Messrs. Silver; Diagrams from old books in the officers' library at Hythe, and the Great Seal Patent Office Library; Lancaster's Wind Sight; Lord Elcho's Weather Screen; a Lockless Gun from Galway; Card Targets from Captain Coles and Mr. Layton; and Lancaster's Marker's Target. A Uniform of St. Martin's Volunteers, about 1796; Musket and Bayonet, ditto; * Print of the Prince of Wales's Loyal Volunteers Preparing for the Grand Review by his Majesty, October 28th, 1803; Sword and Belt, with Badge of Prince of Wales's Loyal Volunteers; Uniform of Prince of Wales's Loyal Volunteers, were contributed by Mr. Philip Palmer; a Whitworth Rifle, by Mr. Scott; an Odomoter by Mr. Newton, of Fleet-street; and several tables of statistics were furnished by officers of the School of Musketry.

The Secretary announced that on Wednesday evening next, May 22, a Paper "On a New Method of Reproducing on Glass and Ceramic Substances any Photographic or other Pictures in Enamel Colours," by Mr. F. Joubert, would be read.

EMIGRATION TO AUSTRALIA.

The Government of Queensland, Australia, have sent over an emigration agent to this country, part of whose business will be to give Lectures on Emigration to the Colony. Such lectures would be given gratuously to any large Mechanics' or Literary Institutions, in or near London, that are in Union with the Society.

Further particulars may be obtained on application to the Secretary of the Society of Arts.

NEW CONSTRUCTION OF SHIPS.

Two models were exhibited at the Conversazione of the Society of Arts, on Saturday, the 4th inst., by the inventor, Mr. John Coryton, in illustration of his "Improved Theory of Naval Tactics." The one is that of a clipper ship, of the

* The weight of the musket is 8¾lbs., and the bayonet is 1lb.

same tonnage as the *Great Eastern*, with a view to show the advantages of Mr. Coryton's "Vertical Wave-line" system of construction over the ordinary form in respect of stowage and ventilation. A fair idea of this model may be formed by fancying one of the latest clipper cutter yachts with her keel melting away from the fore-foot, and her body falling in so as gradually to approach the form of her false counter. The principal novelty lies in the use made of the vessel. In common parlance she is intended half her time to sail "stern foremost." When tacking or steaming head to wind, she proceeds, as is at present the custom with her prototype the yacht, double leeboards being stated to give her all the advantages she could have received from an ordinary keel of twice the depth. When going free she sails stern foremost, and according to the inventor's account her draught decreases as her speed increases. Under such circumstances the terms "bow" and "stern" of course become inapplicable, and are accordingly dismissed in favour of the expressions of "weather" and "lee" end. The vessel, bulk-headed in two places, at which the sections form catenary curves, is of laminated iron, decreasing in thickness upwards and towards the ends. The centre of gravity on this system is placed so as to give stability without uneasy motion, since, on the occurrence of a slight lateral displacement, the axis of rotation varies its position so as to prevent any accumulation of oscillating momentum. The absence of all keel renders her, of course, extremely "handy." A peculiar system of self-reefing sails, also the invention of Mr. Coryton, adapts the marine structure to the novel requirements made upon it by his theory of navigation.

An arrangement, termed an "Atmospheric Guide-propeller," is exhibited in connection with the second model, that of a thirty-foot life-boat. This consists of bell-mouthed tubes—one set on each side—for pumping water in and out; the current on either side can, by a very simple arrangement, be instantaneously reversed, and thus the vessel is propelled and steered by a single hand. In this life-boat the propelling power is exerted by men hauling on an endless rope which works the pumps. The "weather" end is a water-tight compartment, on the principle of Francis's Life-car. There are no thwarts, but seats extending round the remaining part of the boat. The arrangements as regards buoyancy, are very similar to those adopted in the boats of the Royal National Life-boat Institution. The ballast consists of two large iron bars fixed to the bottom of the boat, below the propelling-tubes, and a block of glass, or lead, moveable by a chain, under the deck of the compartment at the weather end, by which any casualty, such as turning "end over end," may be avoided. The boat is launched upon a carriage, which sinks by its specific gravity as the boat floats.

Home Correspondence.

THE ADULTERATION OF FOOD.

Sir,—In the discussion upon my late paper on the above subject (*Journal* for February 1st, 1861), I think it was stated that, in tea adulterated with *valonia*, the latter is extremely difficult, if not impossible, to detect. I was not, at the time, prepared to give any detailed information on this point, as, during the last few years, I had only met with two samples of tea containing the substance in question. I now, however, enclose you a specimen, lately purchased in Westbourne-grove,* for the inspection of any gentleman interested in the matter.

Examined by reflected light, under a magnifying power of about 150 diameters, the presence of powdered *valonia* in the tea is readily observed, as the bright *crystalline aciculæ*, characteristic of that substance, form prominent objects in the field of view.

On the subject of bread adulteration, I wish to make a few remarks referring to Mr. Versmann's letter, published in the *Journal* of Feb. 15th, 1861. First, with regard to alum. Mr. Versmann quoted Dr. Odling as having examined 64 samples of bread purchased at different shops in Whitechapel, not one of which contained alum, the truth being (*vide Chemical News*, No. 71, page 240), that Dr. Odling only examined samples of bread from forty shops in the Lambeth district, in no more than 9 of which he "was unable to detect the presence of alum," 31 samples therefore being adulterated. Secondly, as to the use of sulphate of copper, I have myself detected its presence in three samples of bread, of which (I have every reason to believe) two were from Vienna, and the other one from Munich. In two samples of London flour also I have found traces of copper, but as in these instances the grain had been affected with the "smut," the copper was probably derived from the "blue-stone," which might have been used as a preventive. Mr. John Horsley, of Cheltenham, has also found copper as an adulterant in the bread and flour of that place.

In my paper before referred to, I spoke of the utter impossibility of obtaining perfectly pure mustard in London, a statement I wish now to modify in a slight degree. I have lately examined four samples of mustard (obtained both from the manufactory and from various retailers) bearing the brand of a manufacturing firm at Worcester. None of these can be said to be adulterated, two being perfectly pure, and the remaining qualities merely containing a very little fine turmeric, added for the purpose of improving the somewhat dingy colour of the ground seeds. This pure mustard has only been introduced into the metropolis very recently—I trust that the article may soon be more generally diffused. I need not occupy more of your space, however, by dilating upon the importance of pure mustard either as a vesicant or for culinary purposes, but will conclude with a word of caution to the general consumer, who should never purchase the condiment loose, as it is then always adulterated, either by the manufacturer or retailer. The only chance of obtaining it "genuine as ground," is to buy it in properly secured tins. I am, &c.,

WENTWORTH L. SCOTT.

Bayswater, London, W., May 6th, 1861.

* I enclose also the name of the vendor, *not* for publication, but for your personal satisfaction only.

FILTRATION AND FILTERING MEDIA.

Sir,—My remarks upon this subject last Wednesday night are not quite correctly reported in the *Journal* of the 3rd inst. On the evening in question I recommended the *platinizing* of the "moulded carbon" blocks or balls, in order to render the same more powerfully absorbent and disinfectant for waters containing larger amounts of organic matter in solution. The platinizing process is neither a difficult nor a costly one, and can be accomplished as readily in a drawing-room as in a laboratory. I also stated that I had found animal charcoal superior, in the long run, not only to the ordinary variety from wood, but also to the various prepared "carbons" derived from coke, coal tar, sugar, &c. I am, &c.

WENTWORTH L. SCOTT.

Bayswater, W., May 6th, 1861.

LOCAL EDUCATIONAL BOARDS.

Sir,—Allow me to say, in reply to an observation in Mr. Blake's letter, that there can be no doubt as to the advantage of Local Boards being incorporated into the Central Committee of Educational Unions; and though it would be impossible to have on a united committee representatives of every Local Board, each Board could nominate a representative, and the Boards then ballot for a number to be mutually agreed upon.

I am, &c. BARROW RULE.

Aldershot, May 1861.

MEETINGS FOR THE ENSUING WEEK.

MON. ...R. United Service Inst., 8½. 1. Lt.-Col. Lane Fox, "On a Model illustrating the Parabolic Theory of Projection." 2. Mr. R. T. Pritchett, "A Descriptive Account of the Rifled Arms in the Museum, presented by Foreign Governments."

TUES. ...Royal Inst., 3. Mr. John Hullah, "On the History of Modern Music."
Statistical, 8. Mr. F. Purdy, "On the Earnings of Agricultural Labourers."
Pathological, 8.

WED. ...Society of Arts, 8. Mr. F. Joubert, "On a New Method of Reproducing, on Glass and Ceramic Substances, any Photographic or other Pictures in Enamel Colours."
Geological, 8.
Archæological Assoc., 8½.

THURS...Royal Inst., 3. Mr. Pengelly, "On the Devonian Age of the World."
Numismatic, 7.
Philological, 8. Anniversary.

FRI......Linnæan, 1. Anniversary.
R. United Service Inst., 3. Maj.-General P. Anstruther, "The Electro-Chronoscope, and Trajectory of Balls."
Royal Inst., 8. Professor J. O. Westwood, "On the Metamorphosis of Insects."

SAT.......Royal Inst., 3. Prof. Max Muller, "On the Science of Language."
Royal Botanic, 3¾.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, May 3rd,* 1861.]

Dated 19th April, 1861.

966. J. Ridley, Stagshaw, Northumberland—Imp. in steam generators and superheaters.
967. J. Ridley, Stagshaw, Northumberland—Imp. in cutting apparatus for reaping and mowing machines.
968. J. Ridley, Stagshaw, Northumberland—An improved portable cinder sifting apparatus.
969. W. Grove, 104, Shoe-lane—Imp. in or connected with cylinder printing machines.
970. F. J. Jones, Aldermanbury—An imp. in braces.
972. J. Jobson, Derby—Certain imp. in apparatus to be employed in connection with Cornish and other similar boilers for the purpose of consuming the smoke.
973. W. Hudson and C. Catlow, Burnley, Lancashire—Imp. in looms for weaving.
974. H. Parkes, Birmingham—Imp. in producing ornamented surfaces of metal and other materials.

Dated 20th April, 1861.

976. W. Ryder and T. Ryder, Bolton-le-Moors, Lancashire—Imp. in machines for fluting rollers and for shaping metals.
977. M. Smith, Birmingham—Imp. in annealing pots or pans.
978. J. Whitehouse, Birmingham—Imp. in the manufacture of door and other knobs, and the ornaments of the pillars of metallic bedsteads and other articles of like manufacture.
979. J. Pinchbeck, 35, Whiskin-street, Clerkenwell—Imp. in wet gas meters.
980. R. A. Brooman, 166, Fleet-street—Imp. in mills for grinding corn and other grain. (A com.)
981. J. B. J. Noirot, 29, Boulevart St. Martin, Paris—An improved process for manufacturing india-rubber pipes.
982. W. Clark, 53, Chancery-lane—Imp. in ornamenting porcelain and other earthen wares and glass. (A com.)
983. J. Webster, Birmingham—Imp. in manufacturing oxygen gas and obtaining certain other products.
985. J. Waddell, 6, Hill-street, Knightsbridge—Imp. in drums.
986. A. Smith, Daisy Bank, Sedgley, Staffordshire—Imp. in apparatus for ventilating forges and other overheated workshops.
987. G. A. Huddart and J. D. E. Huddart, Brynkir, Carnarvon—Imp. in steam and other engines.
988. A. V. Newton, 66, Chancery-lane—An improved mode of bleaching and refining oils and other fatty substances. (A com.)
989. A. V. Newton, 66, Chancery-lane—Imp. in the construction of liquid meters. (A com.)

Dated 22nd April, 1861.

990. J. Leech, 68, Margaret-street, Middlesex—Imp. in the manufacture of breech-loading fire-arms, and a new method of attaching the barrel or barrels of a gun to the stock.
994. A. Dugdale, Paris—Imp. in centrifugal governors for steam engines.
996. G. W. Belding, 3, Moor-lane, Cripplegate—Imp. in sewing machines. (A com.)
998. J. T. Dowling, 21, Frampton Park-road, Hackney—An improved instrument applicable to timekeepers, for presenting to view numerals to indicate time.

Dated 23rd April, 1861.

1002. T. Y. Hall, Newcastle-upon-Tyne—Imp. in safety lamps, and in domestic grates, stoves, and furnaces.
1006. P. Ward, 2, Clouds-hill-villas, Bristol—Imp. in the manufacture of suphuric acid.
1008. T. Richardson, Newcastle-on-Tyne—Imp. in the purification of coal gas.
1010. E. H. Bentall, Haybridge, near Maldon, Essex—Improved machinery for cutting or pulping roots to be used as food for cattle.

Dated 24th April, 1861.

1016. E. Woodcock, Forest-hill, Surrey—Imp. in treating flax, hemp, rhea, China-grass, New Zealand flax, plantain, and other vegetable fibres, and in the means or apparatus employed therein. (A com.)
1024. G. H. Birkbeck, 34, Southampton-buildings, Chancery-lane—Imp. in separating or extracting silver from lead. (A com.)
1026. D. Stone, Manchester—Imp. in arrangements or apparatus for preventing water pipes from bursting by the action of frost.
1028. T. Greenwood, Leeds—Imp. in the construction and working of saw frames.

[*From Gazette, May 10th,* 1861.]

Dated 13th February, 1861.

363. E. Butterworth, Spotland, near Rochdale—Imp. in machinery for spinning and doubling cotton and other fibrous substances.

Dated 25th February, 1861.

480. E. F. Barnes, New York—An imp. in railway chairs, and being a combined chair and splice.

Dated 15th March, 1861.

649. G. Dixon, 26, Cecil-street, Strand—Imp. in ploughs. (A com.)

Dated 16th March, 1861.

673. G. H. Birkbeck, 34, Southampton-buildings, Chancery-lane—Imp. in marine propulsion. (A com.)

Dated 30th March, 1861.

780. G. M. Coppo, 13, Rue Gaillon, Paris—Imp. in machinery for fulling felt hats and other felted goods.

Dated 11th April, 1861.

894. C. N. Kernot, Gloucester-house, West Cowes, Isle of Wight, and M. D. Rucker, 116, Fenchurch-street—Imp. in the method of obtaining ammoniacal salts and other valuable products from liquors or substances containing ammonia, and for utilising the residium.

Dated 12th April, 1861.

900. S. C. Salisbury, Essex-street, Strand, and J. Turner, Dalston, Middlesex—An imp. applicable to shuttles for the saving of cop waste.

Dated 13th April, 1861.

912. H. Maden and J. Wheater, Bacup, Lancashire—Certain imp. in machinery or apparatus for spinning cotton, wool, flax, silk, and other fibrous substances.

Dated 15th April, 1861.

920. A. Shanks, 6, Robert-street, Adelphi, Westminster—Imp. in machines for drilling and boring metals.

Dated 17th April, 1861.

943. W. A. Dixon, Newport, Monmouthshire—Imp. in plastering walls and ceilings.

Dated 18th April, 1861.

956. A. V. Newton, 66, Chancery-lane—Imp. in machinery or apparatus for cleaning cotton and other fibrous substances. (A com.)

Dated 20th April, 1861.

984. S. B. Haskard, Wollaton-street, Nottingham, and J. Dean and E. Dean, Radford, Nottinghamshire—Imp. in machinery for the manufacture of looped fabrics.

Dated 22nd April, 1861.

991. H. Moore and A. Higgin, Burnley, Lancashire—Imp. in machinery or apparatus for spinning and doubling cotton, wool, flax, and other fibrous materials.
992. T. P. Hawker, Plymouth—Imp. in the manufacture of cartridges.
993. E. D. Bourne and P. Davis, Birmingham—Imp. in certain kinds of cornice poles and curtain rods, and in the runners used in cornice poles and curtain rods, and in the manufacture of tubing to be made into the said cornice poles and curtain rods.
999. C. Carey, Kennington-green, Surrey—Imp. in the apparatus used in making infusions of coffee and other substances.
1000. A. Henry, Edinburgh—Imp. in fire-arms, and in apparatus to be used therewith. (A com.)

Dated 23rd April, 1861.

1001. R. Shaw, Patricroft, near Manchester, and W. Snodgrass, Portlaw, Waterford, Ireland—Certain imp. in machinery for spinning cotton and other fibrous materials.
1003. W. Clark, 53, Chancery-lane—Imp. in looms for weaving stays or corsets, and other similar articles. (A com.)
1005. J. D. Samuda, Poplar—Imp. in the construction of iron vessels of war.
1007. J. Marshall, 4, Richard-street, Liverpool-road, Islington—Imp. in apparatus used for retarding and stopping railway carriages, and in the construction of railway axles.
1009. E. H. Bentall, Heybridge, near Maldon, Essex—Imp. in constructing the framing of various kinds of agricultural implements.

1011. R. Warry, Chatham—Imp. in the construction of breech-loading ordnance, and in the carriages and projectiles used for the same.
1013. M. Henry, 84, Fleet-street—Imp. in telegraphic apparatus. (A com.)

Dated 24th April, 1861.

1014. A. Leighton, 9, Buckingham-street, Strand—Imp. in springs.
1015. S. Handley, Cancel-street, Walworth, Surrey—Improved apparatus for receiving and consuming the residues of candles or other fatty or oleaginous substances.
1017. F. J. Bramwell, 35A, Great George-street, Westminster—Imp. in machinery for spinning fibrous materials.
1018. E. Lecot, 26, Cecil-street, Strand—An improved nose-bag for horses. (A com.)
1019. C. Stevens, 31, Charing-cross—A new artificial manure. (A com.)
1021. W. Lord and J. Hilton, Royton, near Oldham—Imp. in self-acting mules.
1023. F. N. Gisborne, 3, Adelaide-place, London-bridge—Imp. in the construction of electric targets for rifle and gun practice.
1025. W. Wilson, Newcastle-upon-Tyne—Imp. in the manufacture of hats.
1027. E. H. Bentall, Heybridge, near Maldon, Essex—Improved apparatus for transmitting motion to machinery to be driven by horse power.

Dated 25th April, 1861.

1029. G. Scott, Alpha Works, Isle of Dogs—Imp. in steam engines and other apparatus for generating steam.
1031. D. Barker, Clapham, Surrey—Imp. in signalling and in apparatus connected therewith, adapted to communicating from the land to vessels at sea, and also applicable to other purposes. (A com.)
1033. P. C. Lefol, 2, Rue Sainte Appoline, Paris—Imp. in the manufacture of iron wheels.
1034. C. Callebaut, 2, Rue Sainte Appoline, Paris—Imp. in sewing machines.
1035. W. Harris, Villa-street, Walworth, Surrey—Imp. in treating hides and skins to render them suitable to be made into straps for driving machinery, and to be used for other purposes for which leather is commonly employed.
1037. T. Garner, Moorside, Worsley, Lancashire—Imp. in machinery or apparatus for preparing and spinning cotton, wool, flax, silk, and other fibrous materials.
1039. S. Fox, Stockbridge Works, Deepcar, near Sheffield—Imp. in hardening and tempering steel.
1041. J. S. Templeton, Glasgow—Imp. in looms for weaving pile fabrics, such as "furwarp," or "improved patent Axminster" carpeting, and in weaving the same.
1042. H. Hughes, Homerton, Middlesex, and C. Hill, Nottingham—Imp. in the manufacture of rollers for printing, embossing, and otherwise producing designs, patterns, figures, and shapes.
1043. T. Moore, 33, Regent-circus, Piccadilly—Imp. in windlasses worked by capstans; also, in the means of stopping or checking the chains in connection therewith.
1044. A. V. Newton, 66, Chancery-lane—Improved apparatus for regulating the water level in steam boilers. (A com.)
1045. S. C. Salisbury, Essex-street, Strand, and J. Starley, Lewisham, Kent—An improved combination sewing machine.

Dated 26th April, 1861.

1047. C. J. Hill, Coventry—Imp. in the dials of watches and clocks.
1048. R. J. Cole, 11, Pembridge-gardens, Bayswater—Imp. in ornamenting the backs of brushes.
1049. E. Newby, 35, Camomile-street, Bishopsgate-street Within—An improved connecting link.
1050. J. H. Brown, Romsey—Imp. in apparatus for lubricating the barrels of fire-arms and ordnance.
1051. F. C. Warlich, 14, London street, Fenchurch-street—Imp. in preparing coal used in the manufacture of artificial fuel.
1052. W. Cowan, Edinburgh—Imp. in gas meters.
1053. E. Strangman, Waterford—An improved system of building or construction applicable to architectural and other similar purposes.
1054. W. Griffith, Upper Sydenham, Kent—Imp. in hooped petticoats, or crinolines.
1055. J. Marshall, Liverpool-road—Imp. in preventing the fracture of metals from crystallization.
1056. J. Delagana, Shoe-lane—Imp. in apparatus for embossing and taking casts or matrices for stereotype and other purposes.
1057. E. H. Joynson, St. Mary's Cray, Kent—Imp. in machinery for the manufacture of paper.
1058. J. Watkins, Birmingham—Imp. in carriage axles and axle boxes.
1059. S. C. Salisbury, Essex-street, Strand, and J. Starley, Lewisham, Kent—Imp. in sewing machinery.

Dated 27th April, 1861.

1060. J. Poole, 42, Bridge-street, Blackfriars, and W. Milward, Camberwell, Surrey—Imp. in the construction of hoops or tyres for wheels to be used on railways and tramways.
1061. J. Foster, Radford, E. Bramley, and E. Knutton, Nottingham—Imp. in the manufacture of twist lace and in machinery employed therein.
1062. T. V. Morgan, and J. G. Dahlke, Battersea—Certain improved filtering agents, one of which is applicable in the manufacture of crucibles.
1063. J. B. Farrar and J. Farrar, Halifax—Imp. in machinery or apparatus for spinning wool, cotton, silk, and other fibrous substances.
1065. G. G. Ray, Boston, U.S.—An improved penholder.
1066. W. H. Parsons, Butler's-buildings, Cambridge-heath-road, Middlesex—Imp. in machinery for making nuts, bolts, and rivets.
1067. G. M. Story, 2, Coleman-street, and G. W. Edwards, 27, Minton-street, Hoxton—Imp. in billiard tables.
1068. H. T. Wedlake, 327, Euston-road—Imp. in harmoniums.
1069. H. Bessemer, Queen-street-place, New Cannon-street—Imps. in projectiles and ordnance.
1070. W. E. Newton, 66, Chancery-lane—An imp. in gas burners. (A com.)

Dated 29th April, 1861.

1071. J. Mash, Manchester—Imp. in steam engines.
1073. J. B. H. Desplas, Harfleur, France—A so-called hypocampaphile or elastic apparatus, whereby the legs of running horses are protected from accident.
1074. Capt. H. Dixon, 8, Park-end, Sydenham—Imp. in photography.
1075. W. Johnson, Little Malvern, Worcester—Imp. in saddle trees.
1076. W. E. Newton, 66, Chancery-lane—Imp. in dessicating and torrefying farinaceous and other substances. (A com.)

Dated 30th April, 1861.

1078. G. Hulme, Rochdale—An imp. or imps. in the process of carding wool, cotton, silk, or other fibrous materials, and in machinery or apparatus applicable for that purpose.

Dated 1st May, 1861.

1080. T. A. Kendal, 103, Cowley-street, St. George's-in-the-East, and M. D. Rogers, 2, Bow-lane-cottages, St. Leonard's-road, Bromley—An improved chain cable controller for ship's windlasses to prevent riding of cable in paying out and heaving in of same.
1082. I. Hollis, Birmingham—An imp. or imps. in the manufacture of the guards and trigger plates of rifles and other small arms.
1084. R. Laing, Ince, near Wigan, and I. Swindells, Wigan, Lancashire—Imp. in the treatment of certain ores containing metals, and in obtaining products therefrom.
1086. A. E. Holmes, Derby—Imp. in landaus, sociables, and other like-headed carriages.
1092. R. T. Pattison, Daldorch-house, Ayr—Imp. in the means and method of fixing colors in connection with the printing and dyeing of woven fabrics and yarns.

PATENTS SEALED.

[*From Gazette, May 10th*, 1861.]

May 10th.
2774. D. Thomson.
2789. R. Furnival.
2794. R. H. Gratrix.
2796. J. A. Bruce and G. H. Cottam.
2797. J. F. Reeves.
2800. J. Crooke.
2808. R. A. Brooman.
2816. J. P. Mourguet.
3820. T. Welton and E. H. C. Monckton.
2822. W. H. Woodhouse.
2824. M. L. J. Lavater.
2826. G. Glover.
2830. T. M. Jones.
2842. R. A. Broomah.
2860. T. H. Keble.
2974. F. Jaques.
3046. H. Hall.
444. H. G. Prossor.

[*From Gazette, May 14th*, 1861.]

May 14th.
2801. P. Unwin, J. Unwin, and J. U. Askham.
2815. J. Stockley.
2821. R. A. Brooman.
2826. W. L. Thomas and H. Percival de Bathe.
2825. M. A. J. Dahmen.
2843. J. Hamilton.
2853. W. Cooke.
2859. J. Henry.
2867. G. E. Dering.
2867. G. Macfarlane, W. E. Newton, and R. Carte.
211. F. W. Webster.
377. P. S. Devlan.
557. W. H. Haseler.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, May 10th*, 1861.]

May 6th.
1023. J. M. Duvard.
1071. R. Knight.
May 7th.
1035. W. E. Newton.
May 8th.
1050. G. H. Creswell.
1058. R. Halliwell.

[*From Gazette, May 14th*, 1861.]

May 9th.
1044. J. M. E. Masson.
1055. A. Parkes.
1056. A. Parkes.
May 10th.
1060. J. M. Gilbert.
1083. J. Gardner.
1111. J. Brown.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, May 14th*, 1861.]

May 11th.
1055. J. Platt.

Journal of the Society of Arts.

FRIDAY, MAY 24, 1861.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £400,000, have been attached to the Deed.

The following is a list of those who have signed the Guarantee Deed, with the amounts guaranteed. Those marked with an asterisk are members of the Society of Arts :—

*H.R.H. The Prince Consort ...	£10,000
*Abel, Frederick Augustus, F.R.S. ...	100
*Acland, Sir Thomas Dyke, Bart. ...	200
*Acland, Henry W., M.D., F.R.S. ...	100
*Adam, James Skipper ...	200
Adams, William Salkeld (W. S. Adams & Son)	100
Agnew, Thomas ...	100
Agnew, Thos. Jun. ...	100
Agnew, William ...	100
Ainsworth, Thos. ...	500
*Akroyd, Edward (Jas. Akroyd and Son) ...	500
*Aldam, William ...	100
Alexander, James ...	500
*Alexander, Henry Browne ...	100
*Aley, Frederick William ...	100
*Alger, John ...	100
Allen, C. Bruce ...	100
Allen, Edward Ellis ...	100
*Allhusen, Christian ...	1,000
Allsopp, Henry (Samuel Allsopp and Sons) ...	1,000
Amies, Nathaniel Jones ...	100
*Anderson, Sir James ...	100
Anderson, Thomas ...	100
*Andrew, W. P. ...	500
Angell, Joseph ...	500
*Ansted, David Thos. ...	100
Answorth, W. S. (Middleton and Answorth)...	100
*Antrobus, Sir Edmund, Bart. ...	2,000
*Appold, John G., F.R.S. ...	1,000
Archer, T. C. ...	100
Armitage, Elkanah, and Sons ...	1,000
Armitage, William (Armitage and Rigbys) ...	500
*Armstrong, Sir William George, C.B. ...	500
*Ashburton, Lord ...	3,000
Ashford, William (W. and G. Ashford and Winder) ...	100
Ashton, Thomas ...	500
Asprey, Charles ...	1,000
*Atkinson, William ...	100
Austin, George ...	100
Bagley, Thomas (Henderson and Co.) ...	300
*Bake, Henry ...	200
Baker, Anthony Kington ...	100
Balderson, Henry ...	100
Balfour, George Edward ...	250
*Ball, John ...	500
*Balleras, Guillermo Esteban ...	£500
Baring, Thos., M.P. ...	3,000
Barker, T. Herbert, M.D., F.R.S. ...	100
Barlow, Edward...	100
Barlow, Frederick Pratt (John Dickinson & Co.)	1,000
Barrett, Henry (R. Barrett and Sons)	200
*Bartlett, William Edward ...	100
*Bateman, J. F. ...	200
*Bateman, Joseph, LL.D. ...	100
*Bates, Joshua ...	3,000
Bauer, Victor ...	100
*Bax, Ed. ...	100
*Bazley, Thomas, M.P. ...	1,000
Beale, Samuel, M.P. ...	1,000
Beaumont, John ...	500
Beaumont, Joseph, jun. ...	250
Beckwith, Edward Lonsdale (Boord, Son, and Beckwith) ...	500
*Begbie, Thos. S....	500
Behrens, Solomon Levy ...	300
*Belcher, Sir Edwd. ...	100
*Bell, John ...	100
Bellville, W. J. ...	100
*Bendon, George...	100
*Benedict, Jules ...	300
Benham, Fred. (Benham and Sons) ...	500
Bennett, Henry ...	200
*Bennett, John ...	500
Bennett, Wm. Cox ...	100
Bentall, Edward Hammond ...	100
Bentley, Joseph ...	100
Benyon, Richard, M.P....	1,000
Besley, Frederick ...	200
Besley, Robt. ...	200
Bessborough, Earl of ...	300
Beveridge, Erskine ...	500
Bevington, Samuel B. (Bevingtons and Sons)...	100
Bevington, James B. ...	100
*Beyer, Charles Frederick (Beyer, Peacock, and Co.) ...	1,000
Bicknell, Henry Sanforth ...	500
Biddle, Daniel ...	500
Billinge, James ...	100
Bingley, Alfred William ...	100
Bird, George ...	500
Bird, Stephen ...	250
*Bird, William ...	100
Birkbeck, George Henry (Birkbeck and Tongue)	300
Blacklock, William Thomas ...	500
Blackwell, Samuel ...	200
Blackwell, Thomas (Crosse and Blackwell) ...	300
*Blair, Harrison ...	200
Blandy, John Jackson ...	100
*Blashfield, John Mariott ...	100
Blews, W. H. M. (William Blews and Son)...	100
*Bodkin, William Henry (Assistant Judge) ...	500
*Boileau, Sir John P., Bart. ...	500
Bowker, Charles Hardy ...	100
*Bowring, Edgar Alfred ...	200
*Bowley, Robert Kanzon ...	500
*Braby, Frederick ...	100
Bradbury and Evans ...	1,000
*Bragg, John (T. and J. Bragg) ...	100
*Branston, Robt. E. ...	250
*Brassey, Thos. ...	2,000
Breach, J. G. ...	250
Breffit, E. (Aire and Calder Company) ...	1,000
*Brett, John W. ...	500
Brewster, Sir David, K.H. ...	100
*Bridson, H. ...	250
Brigg, John Fligg (J. Brigg and Co.) ...	150
Briggs, Geo. ...	100
Brock, William ...	250
Brodie, John Lamont ...	100
*Brook, Charles W. ...	200
Brook, Charles, jun. (Jonas Brook & Brothers).	1,000

*Brooke, Chas., F.R.S. ...	£100
Brooke, George (Starkey, Bros.) ...	1,000
Brooke, Thomas (John Brooke and Sons) ...	1,000
*Brooks, Vincent...	200
*Brooman, Richd. Archibald ...	250
*Brough, George (Stratton and Brough) ...	200
Brown, Mrs. H. ...	500
Brown, John (John Brown and Co.) ...	250
Brown, Michael Lewis ...	100
Browning, John (Spencer, Browning and Co.)	250
*Brumlees, James ...	1,000
Buckley, Nathaniel ...	100
*Buccleuch, Duke of, K.G. ...	5,000
Buck, Joseph ...	100
Buckton, Joshua ...	100
Bunning, Jas. Bunstone ...	500
Burgess, James Reeve ...	100
Burrell, Charles ...	500
*Burt, Henry Potter ...	500
*Burzorjee, Dr. ...	100
Cadbury, James ...	250
Caley, Frederick C. (Caley, Brothers) ...	100
Caley, Nathaniel Henry ...	100
Callaghan, William ...	200
*Callow, Thomas (Callow and Son) ...	100
Calvert, Henry ...	100
Cama, Muncherjee Hormusjee...	200
*Campbell, C. Minton ...	2,000
*Campbell, James ...	100
Candy, Charles ...	500
Cannan, Herbert Harris ...	100
*Cassell, Petter and Galpin ...	250
Carstairs, Peter ...	200
Carver, John (Carver Brothers) ...	100
Cave, Stephen, M.P. ...	500
*Chadwick, David ...	100
*Chadwick, Edwin, C.B. ...	100
*Chadwick, John ...	200
*Challoner, Col. T. C. B. ...	500
Chambers, Geo. Wilton (Geo. Wright & Co.)	500
Chambers, Thomas, Common Serjeant ...	100
*Chambers, Thos. King, M.D. ...	300
*Chance, James T. (Chance, Bros.) ...	1,000
*Chandos, Marquis of ...	1,000
*Chantrell, George Frederick ...	100
*Chapman, Edward (Chapman and Hall) ...	300
Chappell, Thos. (Chappell and Co.) ...	500
*Charley, William ...	100
*Charlton, Henry ...	100
*Chater, Joseph	100
Chatfield, Charles ...	100
*Chawner, Richard Croft ...	100
*Chester, Harry ...	300
Christie, William ...	100
Christy, Henry ...	1,000
Christy, Richard (William M. Christy and Sons)	500
*Churchward, Joseph George ...	500
*Clabburn, W. H. ...	100
Clanricarde Marquis of ...	500
*Clare, Charles Leigh ...	250
Clark, Charles, Mayor of Wolverhampton ...	100
*Clarke, I. P. ...	100
Clark, Sir James, Bart. ...	200
*Claudet, A., F.R.S. ...	100
*Clegg, Thos. ...	500
Clifford, Charles ...	200
Clouston, Peter (Lord Provost of Glasgow) ...	100
Clennell, John Edwd. ...	100
*Clowes, Geo. (Clowes and Son) ...	500
*Clutton, John ...	500
Cobbett, Arthur ...	100
*Cobbett, Richard ...	100
Cobden, George Long ...	300
Cock, John, jun. ...	100
Cockerill, William James ...	100
*Cole, Henry, C.B. ...	£300
Cole, Thomas ...	100
Coles, Richard (Mayor of Southampton) ...	100
Collard, C. L. (Collard and Collard) ...	1,000
Collins, Thomas Samuel, M.P. ...	200
*Collyer, Robt., M.D. ...	500
*Colman, Edwd. (J. and J. Colman) ...	1,000
*Colnaghi, D. (Colnaghi, Scott, and Co.) ...	1,000
*Colquhoun, John C. ...	100
Conolly, Thomas, M.P. ...	1,000
*Conybeare, H. ...	1,500
*Cook, Thos. W....	250
Cooke, Christopher ...	250
Cooke, Hindley, and Law ...	1,000
Cooke, Wm. ...	1,000
Coope, Octavius Edward ...	1,000
*Corbett, John ...	100
*Corderoy, Edward ...	100
*Cornforth, John...	100
Copestake, Sampson (Copestake, Moore, Crampton, and Co.) ...	1,000
Cottam, Edward (Robinson and Cottam) ...	300
Cottam, Louis (Cottam aud Co.) ...	300
*Coulthurst, Wm. M. ...	1,000
Cousens, Frederick William ...	300
*Coutts, Miss Burdett ...	3,000
Cowlishaw, Wm. George (James Houldsworth and Co.) ...	200
*Cowie, Thos. S....	500
Cowper, Henry ...	100
*Cowper, The Right Hon. Wm., M.P. ...	100
*Crace, John Gregory ...	200
*Crampton, T. R. ...	1,000
*Creed, Henry ...	100
*Cremer, William Henry, jun. ...	200
*Crisp, Thomas Dawson (Clabburn, Sons, and Crisp ...	100
*Croll, Alexander Angus ...	1,000
Crossfield, Henry ...	500
Cubitt, Lewis ...	500
*Cubitt, Wm. M.P. (Lord Mayor of London)	1,000
*Cundall, Joseph ...	100
*Cunningham, H. D. P., R.N. ...	100
Curt, Joseph ...	100
Cuthell, Andrew ...	1,000
*Daniell, Richard Percival (Daniell & Co.) ...	1,000
*Darbishire, Samuel Dukinfield ...	1,000
Davis, Frederick ...	500
Davies, John ...	100
*Davison, Frederic (Gray and Davison) ...	200
Davy, Charles ...	100
Day, P. A. (C. A. Day and Co.) ...	1,000
*Day, Wm. (Day and Son) ...	1,000
*Deacon, Henry ...	100
*Debenham, William, jun. (Debenham, Son, and Freebody) ...	500
*De la Rue, Warren (Thos. De la Rue and Co.)	1,000
Dent, William ...	200
*Denton, John Bailey ...	100
Dewhurst, George Charnley ...	200
Dickinson, James (W. Dickinson and Sons) ...	500
*Dickson, Peter ...	1,000
*Dilke, C. Wentworth ...	1,000
*Dillon John, (Morrison, Dillon, and Co.) ...	1,000
Dixon, George ...	100
*Dixon, Thomas ...	100
Dixon, Wm. Hepworth ...	100
Dobree, Bonamy ...	500
*Dobson, Benjamin ...	100
*Docker, F. W. ...	100
*Donald, William ...	100
*Donkin, Bryan (Bryan Donkin, and Co.) ...	500
Douglas, Francis Brown (Lord Provost of Edinburgh ...	100
*Doulton, Henry (Doulton and Co.) ...	200

Doveston, George (Doveston, Bird, and Hull)	£300
*Drax, J. S. W. Sawbridge Erle, M.P. ...	100
*Ducie, Earl of	500
Dudley, John Crews	100
Dugdale, James...	1,000
Dunlop, John Macmillan	100
Dunlop, Walter...	200
*Dunn, Thomas	250
*Dunn, Thomas	150
Dyte, Henry	100
Eardley, Sir Culling Eardley, Bart.	1,000
Eastlake, Sir Charles L., President of the Royal Academy	200
*Easton, James, Jun. (Easton, Amos, and Sons)	1,000
*Easton, James, Sen. (Easton, Amos, and Sons)	500
*Ebury, Lord	500
*Edgar, W. S. (Swan and Edgar)	1,000
*Edgington, Benjamin	500
Edmeston, James	100
*Edwards, J. Passmore	100
Edwards, Morton	100
Edwards, Richard (J. Edwards and Son) ...	500
*Elkington and Co.	2,000
*Elliott, Charles (Elliott Brothers)	300
*Elliott, George Augustus	100
Elwell, Edward...	200
*Emanuel, Harry	1,000
England, George	1,000
*Ernest, Henry (Coleman, Ernest, and Rowe)	250
Evans, Edward	100
Evans, E. Bickerton	100
*Evans, Jeremiah (J. Evans and Son)	500
Evans, S. Lavington	100
*Evill, Wm., junr.	300
Evestaff, William Glen...	100
*Ewart, Wm., M.P.	500
Fairbairn, Andrew	500
*Fairbairn, Thomas	1,500
*Fairbairn, Wm., F.R.S.	1,000
Fairbairn, William Andrew	500
Falmouth, Viscount	500
Farrow, Charles (Farrow and Jackson) ...	100
Farlow, Charles	100
Farquhar, Thomas Newman	1,000
Faulkner, David	100
*Fauntleroy, Robert Th. (Robert Fauntleroy & Co.)	100
*Fawell, Thomas	100
Fearon, John Peter	100
Fenton, Francis Henry	100
Feversham, Lord	100
Ferguson, John F.	200
*Field, John	1,000
*Field, William	200
Filmer, Thos. H.	100
Findlay, Charles B.	100
Finnis, T. Q., Alderman	1,000
Firmin, George Jordan...	100
*Fisher, Anthony Lax, M.D.	100
Fisher, Richard	500
*Fisher, Robert	250
Fisher, Samuel	100
Fisher, Samuel	200
*Fladgate, W. M.	500
*Fletcher, John Bowman	100
Forrest, James Alexander	100
Forster, John	250
Forster, Sampson Lloyd	100
Forster, Thos. (Elsmore and Forster)	250
*Fortescue, The Hon. Dudley Francis, M.P. ...	100
Fortnum, Chas. Drury Edward	500
*Foster, John Porter (Foster, Porter, & Co.) ...	1,000
Foster, Wm. Orme, M.P.	1,000
*Fothergill, Benjamin	100
*Fowke, Captain Francis, R.E....	300
Fowler, Charles	£100
*Fowler, John	1,000
Fownes, Edward (Fownes, Brothers, and Co.)	100
Francis, Chas. Larkin (Francis, Bros., and Pott)	500
Franklyn, G. Woodroffe, M.P.	500
*Frith, J. G.	1,000
Froggort, William	100
*Fussell, Rev. J. G. C.	200
Gardner, Robert...	500
Gardner, Samuel (John Kenyon and Co.) ...	200
*Garrett, Richard	500
*Gaskell, John	100
*Gassiot, J. P., F.R.S.	1,000
Gilbey, Walter (W. and A. Gilbey)	1,000
*Gibbs, Henry Hucks	500
*Gibson, The Right Hon. Th. Milner, M.P....	1,000
Gifford, W. J.	200
*Gilbee, William Armond	100
*Glaisher, James, F.R.S.	100
*Glover, Thomas	1,000
Glyn, George Carr, M.P.	500
Glyn, Sir Richard Plumptre, Bart.	500
*Glynn, Joseph, F.R.S.	100
*Godwin, George, F.R.S.	200
Gooddy, Edward (Barlow, Gooddy, and Jones)	250
*Goode, Thos. (Goode and Co.)	250
Gooden, J. Chisholm	200
Goodman, John Dent	100
Goore, William Henry P.	100
Gordon, Lewis Dunbar Brodie	1,000
*Gotto, Henry (Parkins and Gotto)	1,000
*Gower, The Hon. E. F. Leveson, M.P. ...	200
*Graham, Forster (Jackson and Graham) ...	250
*Graham, Peter (Jackson and Graham) ...	1,000
Graham, Wm.	1,000
Graham, William	100
*Grant, Alex.	250
Grant and Gask...	500
*Gray, Captain William, M.P....	1,000
*Granville, The Earl, K.G.	1,500
*Green, Daniel, jun.	100
Green, James	100
Greenall, Gilbert	500
Gregory, Charles	500
*Gregson, Samuel, M.P....	100
*Griffiths, Robert	250
Grissell, Henry	500
Grove, George	100
*Guedalla, Henry	500
Gundry, William (Gundry and Sons) ...	100
Gunter, Richard	300
*Gurney, Samuel, M.P.	1,000
*Gwynne, J. E. A. (Gwynne and Co.) ...	500
Hacking, Richard	1,000
*Haden, Frs. Seymour	100
Hadfield, William	100
*Hall, S. C.	200
*Hale, Warren Stormes, Alderman	1,000
*Hancock, Charles Frederick	1,000
*Hanhart, N. (M. and N. Hanhart)	100
*Hankey, Thomson, M.P.	500
*Hannington, Charles Smith	100
Hargreaves, W.	200
Harris, James	200
*Harrison, T. E....	100
*Harrison, W., F.G.S.	500
*Hart, Charles (Joseph Hart and Son)... ...	100
Hart, Ernest	100
Harter, James Collier	1,000
*Hartley, James (J. Hartley and Co.)... ...	1,000
Hatch, Henry	100
Haward, H. G.	100
Hawkins, George	200
*Hawkshaw, John, F.R.S.	1,000

Haworth, J.	£100
Hayes, Henry William (Hayes and Co.) ...	1,000
Headley, Richard	100
Heald, Nicholas...	100
*Healey, Elkanah	100
*Heather, James...	100
Hemming, Frederick H.	100
Henderson, John (Banks Bros., Henderson & Co.)	200
Henderson, George William Mercer	500
Henty, Robert	500
Hepworth, William	100
Heron, Joseph	250
Heugh, John	500
*Heymann, Lewis, (Heymann and Alexander)	1,000
*Heywood, J. Sharp C.	500
Hibbert, George...	500
Hibbert, John Tomlinson	100
Hill, Charles	300
Hill, Thomas Rowley (Hill and Evans) ...	100
Hindley, Charles Hugh (Chas. Hindley and Sons)	1,000
Hinstin, Ernest (Hinstin Bros.)	150
Hirst, Joseph	500
Hirst, William Edwards	250
Hitchcock, George Charles	250
*Hobbs, Ashley, and Co.	1,000
Hodges, John Francis	100
Hodgkinson, Grosvenor, M.P.	100
Hodgson, Kirkman Daniel, M.P.	500
Holdsworth, William Bayley (W. B. Holdsworth & Co.)	100
Holland, James (Holland and Sons)	1,000
Holland, Sir Henry, Bart.	200
*Hollins, M. Daintry	2,000
*Holmes, James	300
Hoole, Henry E.	500
*Hope, Henry Thomas	2,000
*Hooper, Geo. N. (Hooper and Co.)	250
Hopkinson, James (J. and J. Hopkinson) ...	200
*Hopkinson, Jonathan	500
*Horn, James	100
Hornblower, Jethro (Hornblower, Fenwick, and Co.)	500
*Hoskyns, Chandos Wren	500
Horsley, J. Callcott, A.R.A.	100
Horton, Isaac (Horton and Sons)	500
*Houghton, F. Burnett	100
Hovenden, Robert	100
*Hubert, Samuel Morton (John Woollams & Co.)	500
Hughes, James	100
*Humby, George...	100
*Hunt, John (Hunt and Roskell)	2,000
*Hunt, Henry A.	500
Hunt, T. N.	500
Hunter, Michael, jun. (Master Cutler of Sheffield)	100
Hutchinson, John (Hutchinson & Earle) ...	1,000
*Hutt, The Right Hon. William, M.P. ...	1,000
*Hutton, Thomas	100
*Hyam, David (Alfred Davis and Co.)... ...	1,000
Hynam, John	200
*Ibbotson, Thos. Hamer (Ibbotson and Langford)	250
Ionides, Alexander Constantine	100
*Isaacs, Saul (S. Isaac, Campbell, and Co.) ...	1,000
*Jackson, John, jun. (Geo. Jackson and Sons) .	200
*Jackson, John, jun.	100
*Jackson, Samuel	200
James, D. D. (Wm. Cory and Son)	500
*James, Jabus Stanley (Powis James and Co.). .	100
*Jarrett, Griffith	500
*Jeanes, John (Johnstone and Jeanes) ...	500
*Jeffery, Wm. S. (Howell, James, and Co.) ...	1,000
Jenkins, Leonard (Jenkins, Hill, and Jenkins)	500
Joel, Joseph	1,500
Johnson, Edmund	100

Johnson, Frederick	£500
Johnson, J. M., ...	100
*Johnson, Henry	1,000
*Johnson, Richard	100
*Jones, David Morgan (John Morgan and Co.).	100
Jones, Frederick John	100
Jones, Edward	100
Jones, John	500
*Jones, Owen	100
*Joubert, Ferdinand	200
*Keeling, Henry Levy	250
Keighley, William	250
*Keith, Daniel	500
*Kelk, John	3,000
*Kelly, Sir Fitzroy, Q.C., M.P.	1,000
*Kelsall, Henry (Kelsall and Kemp)	200
*Kent, George	200
*Kimber, Thomas	200
*Kimpton, Thomas	250
*Kinder, Arthur	100
*Kisch, S. Abraham	100
*Kitson, James (Mayor of Leeds)	500
*Knight, George	100
Knill, Stuart	250
Knowles, John	100
*Ladd, Wm.	100
*Lambert, Charles (Lambert and Butler) ...	500
*Lambert, Thomas (T. Lambert and Son) ...	500
*Landon, James	100
*Lang, Robert	100
*Langton, Wm. H. Gore, M.P.	500
*Langworthy, Edward Riley	250
*Lankester, Edwin, M.D.	100
*Lansdowne, Marquis of, K.G.	1,000
*Lavanchy, John R.	100
*Lawrence, Frederick	200
*Lawson, A. M. (Peter Lawson and Son) ...	1,000
*Lea, John W. (Lea and Perrins)	100
*Leaf, Sons, and Co.	1,000
*Leather, J. Towlerton	500
*Le Breton, Francis	200
Ledger, Robert Goulding	100
Lee, Levin (Lee Brothers)	100
*Leeks, Edward Frederick	100
*Leighton, John	250
*Leeman, George (Lord Mayor of York) ...	200
Leppoc, Henry Julius	100
Lethbridge, J. C.	500
*Letts, Thomas, jun.	100
Leuchars, William	500
*Levinsohn, Louis	100
*Lewis, Arthur (Lewis and Allenby)	1,000
*Lewis, Harvey, M.P.	2,000
Lewis, James	100
*Lewis, Waller, M.D.	100
Lewis, Wm., Alderman	100
Lezard, Joseph (Baumé & Lezard)	200
Liebert, Bernhard	500
Lindley, Dr. John, F.R.S.	100
Lings, Thomas	100
*Little, Thomas	200
*Lloyd, Sampson	200
Lloyd, Samuel, junr., (Lloyd and Lloyd) ...	100
*Lockwood, Ben.	250
Loader, R. and Co.	500
Lock, Samuel Robert (Lock and Whitfield) ...	500
Lorimer, George (Master of Merchant Co., Edinburgh)	200
*Losada, J. R.	200
Lowe, J. Stanley	100
*Loysel, Edward, C.E.	1,000
Lucas, Charles (Lucas, Bros.)	1,500
Lucas, James J. H.	1,000
Lucas, Thomas (Lucas, Bros.)	1,500

Lucas, Philip	£300
Ludlam, Jeffrey	300
Lumley, Wm. Golden	100
*Lutwidge, R. W. S.	500
*Lyell, Sir Charles	300
Lyle, James Grieve	200
*Lyon, Arthur	100
*Lyons, Morris	100
*Macadam, Charles Thomas	100
Macarthur, Major-General Edward	1,000
*Mackintosh, R. J.	100
*Mackrell, W. T.	500
*Maclea, Charles G.	200
Mac Leod of Mac Leod	500
Malcolm, John	500
Mallinson, Thos.	500
*Manby, Charles, F.R.S.	100
Mansfield, Geo. (Wright and Mansfield) ...	300
Mappin, Frederick Thorpe (Thomas Turton and Sons)	250
Mappin, John Newton (Mappin and Co.) ...	500
Mappin, Joseph Chs. (Mappin Brothers) ...	200
Marjoribanks, D. C., M.P.	1,000
*Marjoribanks, E.	2,000
Marrian, J. P.	100
*Marsh, M. H., M.P.	500
Marshall, Thomas R. (Wm. Marshall and Co.)	100
Marshall, William	200
Martin, George William	100
Martin, Richard (Martin, Hall, and Co.) ...	200
Martin, W. H.	100
Martineau, Joseph	1,000
Martyn, Silas Edward	200
*Maw, Geo.	250
May, Walter (Walter May and Co.)	100
Maynard, Joseph	1,000
McClure, William	100
McConnel, Henry	1,000
McConnel, James	100
McConnel, William	100
*McCormick, William, M.P.	2,000
McCracken, James John (J. & R. McCracken)	200
*McFarlane, Walter	100
Mc Garel, Charles	1,000
*McLean, John Robinson	2,000
McQueen, William Benjamin (McQueen, Bros.)	500
*Mechi, J. J. Alderman	1,000
Mellor, Wright	250
*Messenger, Samuel (Messenger and Co.) ...	500
Metchim, William Paul	100
Metzler, George (Metzler and Co.)	300
Meyers, Barnett	100
Michell, Richard	300
Micholls, Henry	100
Miles, Alfred Webb	300
*Miles, Pliny	200
Mills, Charles	500
Mills, Edward W.	500
*Mitchell, Rev. M.	100
Moate, Charles R.	1,000
*Montgomerie, H. E.	100
*Moreland, Joseph	100
Moreton, John	100
*Morley, Samuel..	1,000
Morgan, John	100
*Morgan, Wm. Vaughan (Patent Plumbago Crucible Company	500
Mosley, Thos. (Thos. Mosley, Huish, and Co.)	100
*Muir, William	100
*Munn, Major W. Augustus	100
*Murchison, John Henry	100
Murchison, Sir Roderick Impey, F.R.S. ...	500
Murray, Eugene	200
*Murray, John	1,000
*Myers, George	1,000

*Napier, Hon. Wm.	£500
Needham, Wm. (Needham and Kite) ...	200
Neighbour, George L. (Neighbour and Sons)	500
Neild, William (Thomas Hoyle and Sons) ...	1,000
Newbold, Robert (Jos. Rogers and Sons) ...	250
Newen, George	1,000
*Newton, Frederic (Newton and Co.)	100
*Nicholay, J. A.	1,000
*Nicholls, G. P. (J. and G. Nicholls)	200
Nichols, Richard	100
Nichols, Robert Cradock	100
*Nicoll, Donald (H. J. and D. Nicoll) ...	1,000
*Nind, Philip	300
*Nightingale, Charles (W. and C. Nightingale)	250
North, David (Wright and North)	100
Northcote, Stafford H. (S. Northcote and Co.)	250
Novelli, Augustus H.	1,500
Obbard, Robert	100
*Odams, James	200
Olivier, Charles Henry (Olivier and Carr) ...	200
Oppenheim, John Moritz	1,000
Ordish, R. M. (Ordish and Le Feuvre) ...	100
Osborne, Charles	100
Osler, Clarkson (F. and C. Osler)	500
Other, Christopher (Other and Robinson) ...	500
Palk, Sir Lawrence, Bart., M.P.	200
Palmer, Geo. (Huntley and Palmers) ...	200
*Pakington, The Rt. Hon. Sir John, Bart., M.P.	200
Panizzi, Antonio	200
*Palmer, Philip	100
Parker, Charles	300
Parker, James	100
*Part, John Cumberland	100
*Paterson, John	500
*Payne, James	250
*Peake, Thos.	250
Pearce, John (Halling, Pearce, and Stone) ...	1,000
Pease, Henry, M.P. (H. Pease and Co.) ...	250
Pease, Joseph (J. and J. W. Pease)	1,000
Pedler, George Stanbury	100
*Peel, George	200
Pender, John (Pender and Co.)	500
*Penn, John	1,000
Perry, Stephen (Perry and Co.)	100
Philips, Robert Nathaniel	100
Phillips, Fredk. D., (Phillips and Samson) ...	100
Phillips, Mark	100
Phillips, George (W. P. and G. Phillips) ...	500
*Phillips, Robt.	1,000
*Phillips, Sir Thomas, F.G.S.	300
*Phillips, Wm. Phillips (W. P. and G. Phillips)	500
Phythian, Thomas	100
Pike, Robert	100
*Pickstone, William	100
*Pillischer, M.	100
*Pinches, T. R.	150
Pitts, Samuel	100
*Platt, John (Platt, Brothers, and Co.) ...	500
Playfair, Dr. Lyon, C.B.	200
Plowman, Joseph	100
*Pollard, Geo.	100
Poole, Henry	1,000
Poole, Thos. (Poole and Macgillivray) ...	100
Pope, W. A.	100
*Portal, Wyndham S.	100
Potter, Alan	1,500
*Potter, Edmund, F.R.S.	500
*Potter, William Simpson	500
Poulter, James	100
Powell, William (John Hardman & Co.) ...	500
Power, Bonamy Mansell	1,000
*Prescott, W. G....	1,000
Price, David	1,000
Price, Dr. David Simpson	100

Price, George	£100
*Pritchard, John, M.P.	200
Privett, Harry	100
Purssell, Alfred	100
*Purvis, Prior, M.D.	100
Quin, Fredk. F., M.D.	200
Quilter, William	100
Ramsay, Rear Admiral Wm., C.B.	100
*Ransford, Henry	100
*Ratcliff, Charles	500
*Rawlinson, Robert	100
*Read, Reginald, M.D.	200
*Redgrave, Alex.	100
Redgrave, Richard, R.A.	200
*Redgrave, Samuel	200
Reed, Charles, F.S.A.	100
*Reiss, James	500
Rich, Sir Charles, Bart.	200
Richards, Westley	200
Richardson, James (Richardson Brothers)	500
Richardson, John (Henri's Patent Cattle Feed Company)	100
Richardson, G. B.	100
*Richardson, Thomas	200
Rickards, Francis Philip	100
*Rideout, William Jackson	250
*Rimmel, Eugene	100
Robb, Alexander	500
Roberts, Daniel	100
Roberts, Edward, F.S.A.	100
Robertson, David (Robertson Brothers, and Co.)	100
Robinson, F. (Robinson and Cottam)	300
*Robinson, Henry Oliver	500
*Robinson, James (Rigby and Robinson)	500
Robinson, J. C.	100
Robinson, John (Sharp, Stewart, and Co.)	500
Robinson, John Henry	100
Robotham, Samuel	100
*Rock, James, junr.	100
Roe, George	250
Roebuck, Samuel	100
Rogers, Francis	100
Rolt, Peter	1,000
*Roney, Sir Cusack P.	1,000
Rose, Hugh (Chairman of Chamber of Commerce, Edinburgh)	200
*Rose, J. Anderson	100
*Rose, Wm. Anderson, Alderman	500
Rosse, The Earl of	1,000
Rothery, H. Cadogan	100
Round, Joseph	100
*Routledge, Thomas, jun.	100
Rumbold, Wm. Henry	100
*Rumney, Robert	100
*Ryland, Arthur, Mayor of Birmingham	100
*Rylands, John (Rylands and Sons)	500
Sacred Harmonic Society, Exeter Hall	1,000
*Sadler, Charles James	100
*Salisbury, The Marquis of, K.G.	1,000
Sandeman, George G.	1,000
*Salomons, Aaron	500
*Salomons, David, Ald., M.P.	250
*Salt, Titus	3,000
Samson, Henry	100
*Samuel, James	1,000
*Sandford, Francis Richard	100
Sangster, John (W. and J. Sangster)	100
Sassoon, Sassoon David	1,000
Saul, George Thomas	100
*Saunders, Wm. Wilson, F.R.S.	500
Savory, John	500
Sawyer, Frederick	2,500
Schlesinger, Julius	100
*Schuster, Leo	3,000

Schwabe, Adolph (Salis, Schwabe, and Co.)	£500
Scott, Walter	100
Scott, William (Rogerson and Co.)	1,000
Seaman, William Mantle	100
*Sedgwick, John Bell	100
Shanks, Andrew	250
*Sharples, Joseph	200
Shaw, Charles Thomas	100
*Shearer, B. P.	200
Shelley, Sir John Villiers, Bart., M.P.	100
*Sheriff, Alexander Clunes	100
Shilson, William	200
Shove, W. S.	500
*Shuttleworth, Joseph	1,000
*Siemens, Charles W.	100
Silk, Robt. (Silk and Sons)	100
Siltzer, John (Siltzer and Co.)	500
*Simon, George (Lightly and Simon)	500
*Simpson, W. B.	100
Slade, Felix	500
*Slaney, Robt. A., M.P.	100
*Smirke, Sydney, R.A.	1,000
Smith, George (Wm. Smith, Son, and Co.)	500
*Smith, George Henry (Wrigley and Smith)	100
Smith, George Robert	500
*Smith, James	500
Smith, John	100
Smith, John (Beckett & Co., Bankers)	1,000
Smith, Mark (Wm. Smith and Brothers)	300
Smith, R. M.	250
*Smith, Wm. H.	500
Smith, William	100
*Smith, William, C.E.	150
Snelgrove, John (Marshall and Snelgrove)	1,000
*Solly, S. R., F.R.S.	300
Solomon, Henry	250
*Solomon, Joseph	100
Solomon, Leon	1,000
*Somes, Joseph, M.P.	1,000
*Sopwith, Thos., F.R.S.	200
Sotheby S. Leigh	500
Sowler, John	100
Sowler, Thomas	100
*Spark, Henry King	500
Sparrow, Chas. (Sparrow Brothers)	100
Spence, James	250
*Spicer, Wm. R. (Spicer Brothers)	500
*Spiers, Richard James	250
*Squire, William	500
Stainton, James Joseph	100
Standen, Richard Spiers (Standen and Co.)	100
Standish, John	200
Stanley, Lord, of Alderley	500
*Stanley, Right Hon. Lord, M.P.	500
Standring, James (Mayor of Margate)	100
*Stanton, George	100
Starey, Thos. Rowstorn	200
*Starr, Henry (Wheatley and Starr)	1,000
Steane, James S. (Oxon Wine Co.)	100
Stephenson, Henry (Stephenson, Blake, & Co.)	100
Steers, Spencer James	100
Steinthal, Henry Michael	100
Stern, Sigismund James	500
Stillwell, Edwd. Swift (Stillwell, Son, and Ledger)	250
Stirling, William (Wm. Stirling and Sons)	500
Stock, T. O.	300
Story, George M.	100
*Straker, Samuel (Straker and Son)	100
Stubbs, Henry	200
*Sulivan, Right Hon. Laurence	100
*Sutherland, Duke of	500
Sutton, M. H. (Sutton and Sons)	250
Sylvester, Professor J. J., F.R.S.	100
*Taber, John	100

*Tagg, William	£100
Tamplin, F. A.	250
Tannett, T. (Smith, Beacock, and Tannett)	500
*Tapling, Thomas (Thomas Tapling and Co.)	1,000
Taunton, Lord	1,000
Tayler, J. Frederick	200
*Telford, Charles	500
Thackeray, W. M.	100
Thomas, John Evan	100
*Thompson, Harry S., M.P.	250
Thompson, R. A.	100
Thompson, William	250
*Thring, Henry	100
*Thurston and Co.	500
Tillett, Samuel	100
*Todé, Edward Henri	300
Tod-Heatly, Grant H.	300
*Topham, John	150
*Tottie, Charles	500
*Tootal, Edward	500
Towle, John	100
Tregelles, Nathaniel (Tregelles and Taylor)	100
Treggon, Wm. Thomas (Treggon and Co.) ...	100
Trower, Geo. S.	200
Truscott, Francis Wyatt (Truscott, Son, and Simmons)	500
Truss, T. Seville	100
Tubbs, Robert	100
Tuely, Nathaniel C.	100
Turner, B. B. (Brecknell, Turner, and Sons)...	500
*Twining, Thos., jun.	1,000
*Tylor, Alfred (J. Tylor and Sons)	1,000
Tysoe, John	100
Underhay, Frederick George	100
*Underwood, Joseph	1,000
Uzielli, Theresa	5,000
*Uzielli, Theodosius	3,000
Vallentin, James	200
*Venning, James M.	100
*Veitch, James Jun.	100
Vernon, G. Harcourt	100
Viccars, Richard	250
Vickers, Henry (Mayor of Sheffield)	100
*Vieweg, Augustus Julius	200
*Vignoles, Charles F. R. S.	1,000
*Vigers, Edward	100
*Virtue, James Sprent	500
*Walker, James, F.R.S....	1,000
Walker, Joseph William	250
Wallis, John	100
*Walter, Captain Edward	500
Walters, Edward	100
*Ward, John	500
Watkins, William	100
Watson, J. (James Nisbet and Co.)	100
*Webb, John	1,000
Webster and Horsfall	500
*Welch, John Kemp	500
*Welch, John Kemp (Schweppe and Co.) ...	500
*Westhead, J. P. Brown, M.P. (J. P. and E. Westhead and Co.)	1,000
*Westley, W. (Carpenter and Westley) ...	200
*Westmacott, Richard, R.A.	100
*Wetter, Conrad	100
*Whatman, James	1,000
Whelon, W. (Mayor of Lancaster)	100
*Whichcord, John, F.S.A.	500
*Whishaw, James	100
White, Arthur Bernard	100
White, Geo. (J. B. White and Brothers) ...	500
White, Henry	100
*White, Henry Clarence	250
*Whitehead, James Heywood	£250
*Whittingham, Charles	200
*Whittington, Rev. Rich.	100
Willans, William (President of the Chamber of Commerce, Huddersfield)	500
Wildes, George	300
*Willet, John, C.E.	100
*Wilkinson, David (Molineaux, Webb, and Co.)	200
*Wilkinson, John, jun. (John Wilkinson, Son, and Co.)	500
*Williams, Joseph William Hume	100
*Williams, H. R.	100
*Williams, Wm.	100
Williamson, Robert	100
Willis, George (Willis and Sotheran) ...	500
Willoughby d'Eresby, Lord	1,000
Wilson, Erasmus, F.R.S.	200
*Wilson, George F., F.R.S.	500
*Wilson, Professor John	300
*Winkworth, Thomas	100
Winsor, William (Winsor and Newton) ...	500
*Withers, Geo.	100
*Wodderspoon, James	1,000
Wodehouse, Lord	100
*Wood, John	100
Wood, Joseph	100
*Wood, Nicholas	100
*Wood, Vice-Chancellor Sir W. Page	100
Woodcock, William	100
*Woodd, Basil T., M.P.	250
*Woodd, Robert Ballard	500
*Woodhouse, John Thomas	500
*Woollams, Henry (Wm. Woollams and Co.).	250
*Woollcombe, Thomas	100
Wright, T. B.	100
Wrigley, Thomas	500
Wrigley, Joseph, Jun. (J. and T. C. Wrigley and Co.)	250
*Wyatt, M. Digby	100
Wyld, William	100
*Yolland, Col. Wm.	100
Younghusband, Joseph Taylor	500
*Zanzi, Alexander	100

Her Majesty's Commissioners have appointed the following Committees:—

In connection with Classes 5, 7, 8, and 10 (Railway plant, Manufacturing Machines, Machinery in general, Civil Engineering, Architectural and Building Contrivances), the Duke of Sutherland, the Earl of Caithness, John Anderson, Esq., Frederick J. Bramwell, Esq., Joseph Cubitt, Esq., James Fenton, Esq., John Fernie, Esq., Captain Douglas Galton, R.E., Thomas Elliot Harrison, Esq., George Wilhoughby Hemans, Esq., Sampson Lloyd, Esq., John Robinson McClean, Esq., Henry Maudslay, Esq., John Penn, Esq., John Scott Russell, Esq., F.R.S.

In connection with Class 11 (Military Engineering, Armour and Accoutrements, Ordnance and Small Arms), Major-General the Hon. James Lindsay, M.P.; Colonel Shafto Adair, Suffolk Militia Artillery; Captain Tyler, R.E.; Major Porter, R.E.; Lieutenant-Colonel A. Lane Fox, Grenadier Guards; and Captain A. C. Tupper, Brecknockshire Rifle Militia.

In connection with Class 14 (Philosophical Instruments and processes depending on their use), Sir David Brewster, F.R.S.; Professor B. C. Brodie, F.R.S.; Mr. Charles Brooke, F.R.S.; Dr. Carpenter, F.R.S.; Dr. Franklin, F.R.S.; Mr. Francis Galton, F.R.S.; Mr. J. P. Gassiot, F.R.S.; Professor Tyndall, F.R.S.; and Professor Wheatstone, F.R.S.

The Commissioners have received information that Local Committees have already been formed

(in addition to those given last week) at the following places :—

Bristol.

Local Committee :—

The Mayor; Robt. Laing, Chas. Nash, John Hare. Esquires, Town Councillors; and Wm. Nash, Esq., Magistrate; Dan. Burgess, jun., Esq., Town Clerk.

Ipswich.

Edward Grimwade, Esq., Mayor, Chairman.

Northampton.

Pickering Phipps, Esq., Mayor, Honorary Secretary.

Oxford.

The Mayor, Chairman.
R. J. Spiers, Esq., F.S.A., J.P., Honorary Secretary.

Worcester.

The Town Council and Chamber of Commerce.
Richard Woof, George Clarke, } Esqrs., Honorary Secretaries.

The following arrangements (in addition to those published last week) have been made in foreign countries to represent the interests of intending exhibitors :—

France.

The following Commission has been appointed :—
The Prince Jérôme Napoléon, President.
M. Rouher, M. le Comte de Persigny, M. le Maréchal Comte Vaillant, M. Thouvenel, M. Achille Fould, M. Drouyn de Lhuys, M. Schneider, M. Mérimée, M. Michel Chevalier, M. Baron Gros, M. Arlès-Dufour, M. Leplay, and M. Gervais (de Caen).

CONVERSAZIONE.

The Second Conversazione of the present Session will be held on Saturday, the 1st June, at the South Kensington Museum. The card for this Conversazione will admit the Member and two ladies, or one gentleman.

TENTH ANNUAL CONFERENCE.—OTICE TO INSTITUTIONS.

The Tenth Annual Conference between the Representatives of the Institutions in Union and the Council will be held on Tuesday, the 18th of June, at half-past 10 o'clock in the morning. Sir Thomas Phillips, Chairman of the Council, will preside.

Secretaries of Institutions in Union are requested to forward, as soon as possible, to the Secretary of the Society of Arts, the names of the Representatives appointed to attend the Conference, stating at the same time (if possible) whether those gentlemen will also be present at the Society's Annual Dinner, which will take place on the following day, and of which particulars are given below.

The Chairmen of, or Representatives from, the several Local Boards of Examiners are invited to attend.

ANNUAL DINNER.

The One Hundred and Seventh Anniversary Dinner of the Society will take place at the Crystal Palace, Sydenham, on Wednesday, the 19th June, at 5 o'clock, punctually. The Right Hon. the Earl of Elgin and Kincardine, K.T., G.C.B., will preside.

The Members and their friends will assemble in the ante-room of the Dining Hall, in the Railway-wing, at half-past four o'clock. Application for Tickets (price 10s. 6d. each) should be made to Mr. Samuel Thomas Davenport, at the Society's House, on and after Wednesday next, the 29th of May. It is particularly requested that those who intend to be present should take their tickets as soon as possible in order to facilitate the arrangements.

TWENTY-THIRD ORDINARY MEETING.

Wednesday, May 22, 1861.

The Twenty-Third Ordinary Meeting of the One Hundred and Seventh Session was held on Wednesday, the 22nd inst., John Dillon, Esq., Vice-President, in the chair.

The following gentlemen were proposed for election as members of the Society :—

Bashford, Frederick ...	43, Porchester-square, Hyde-park, W.
Butter, Henry............	4, Minerva-place, Barnsbury-park, N.
Cousens, Richard Thos.	4, Kensington-palace-gardens, W.
Cremer, William Henry	27, New Bond-street, W.
Galen, Alexander	8, Percy-circus, Pentonville, W.C.
Holden, Isaac............	Dockroyd, Yorkshire.
Moule, John	15, Seabright-place West, Hackney-road, N.E.
Rothschild, Baron Lionel N. de, M.P. ...	New-court, St. Swithin's-lane, E.C.; Kingston-house, Prince's-gate, S.W.; and Gunnersbury-park, Ealing, W.
Smith, George	27, Norfolk-crescent, Hyde-park, W.
Tuckett, C., Junr.......	British Museum, W.C.
Webb, Thomas	37, Bedford-place, Russell-sq., W.C.

The following candidates were balloted for and duly elected members of the Society :—

Atkins, John P.	Halstead-place, Sevenoaks, Kent.
Barnett, George Henry...	42, Wilton-crescent, S.W.
Boyes, John	8, Kensington-garden-terrace, W.
Brown, Edward	East-hill, Wandsworth, S.W.
Chomel, J. A.	4, St. James's-street, S.W.
Cohen, Barnet Solomon...	9, Magdalen-row, Goodman's fields, E.
Douglas, Sir Charles, K.C.M.G., M.P.	27, Wilton-crescent, S.W.
Garnett, William J., M.P.	21, Grosvenor-place, S.W.
Goff, Joseph, Jun..........	Little Cashiobury, Watford.
Goldsmid, Frederick, D.	50, Harley-street, W.

Gridley, Captain H. Gillett	49, Wilton-crescent, Belgrave-square, S.W.
Hamilton, Sir Robert N. C., Bart.	129, Park-street, Grosvenor-square, W.
Howard, Sir Ralph, Bart.	17, Belgrave-square, S.W.
Innes, John, Jun.	46, Porchester-terrace, W.
Jackson, Richard Medland	45, Piccadilly, W.
Knight, Valentine	3, Cornwall-terrace, Regent's-park, N.W.
Losada, J. R.	105, Regent-street, W.
Marjoribanks, Edward	34, Wimpole-street, W.
Meekins, T. Mossom, B.A.	32, Lincoln's-inn-fields, W.C.
Moreton, Hon. A. H. Macdonald	112, Gloucester-place, Portman-square, W.
Neal, John	16, St. James's-place, S.W.
Palliser, Captain Arthur	70, Inverness-terrace, Kensington-gardens, W.
Park, Lieut.-Colonel Archibald	41, Porchester-square, W.
Petrie, Samuel	46, Ebury-street, S.W.
Reid, Lestock Robert	122, Westbourne-terrace, Hyde-park, W.
Rennie, George Banks	39, Wilton-crescent, S.W.
Routledge, G. F.	21, Kensington-park-gardens, W.
Scott, J. S.	46, Kensington-park-gardens, W.
Sibthorp, Henry A. M. Waldo	57, Chester-square, S.W.
Sparkhall, Edward	142, Cheapside, E.C.
Tayler, James George	23, Norfolk-crescent, Hyde-park, W.

The Paper read was—

ON A NEW METHOD OF PRODUCING ON GLASS, PHOTOGRAPHS OR OTHER PICTURES, IN ENAMEL COLOURS.

By F. Joubert.

Of all the inventions to which the genius of man has given birth, and which have been progressively developed and brought, by his industry, to a high degree of perfection and usefulness, the art of glass-making is certainly one of the most interesting and extraordinary; at the same time as it is doubtless one which has tended to increase our comforts and our enjoyments in a degree almost unequalled by any other discovery of modern civilization.

If we look back to the dark ages, and find that in those days even the rulers of the earth had no means of keeping rain and bad weather from their habitations, except by also shutting out the light, we shall be ready to acknowledge the astonishing results, as compared with the present state of things around us, which the persevering efforts of man have, under the guidance of an ever-merciful Providence, been able to accomplish.

Before entering into the description of the process which is more immediately the subject of our meeting this evening, I would, in a concise manner, and, as far as the necessarily limited time I have to occupy this place will allow me, recapitulate the history and progress of the invention of glass itself, and of glass painting which has led to the process before us.

We have no distinct evidence to show what nation first used glass, and we must therefore be satisfied with the various traditions transmitted to us, from age to age, on the subject. One fact, however, seems established beyond the possibility of a doubt, viz.: that the greatest antiquity can be assigned to this invention, since the Egyptians and the Phœnicians had both vessels and ornaments made of glass, crude in form, but of a substance so perfect, by whatever means obtained, that it has stood the trial of several thousand years, and may be pronounced to have suffered no deterioration. Might we not, in consequence, assign to glass a place in the list of useful inventions far higher than that which it occupies; for in this we have a discovery, the first inventors of which seem to have attained, at once, the very condition—durability—which humankind is incessantly bent upon obtaining for any produce of its hands.

But still more remote is the mention of glass in the Holy Scripture; for, if the interpretation of the text be a correct one, in the 18th chapter of Job, as also in several other parts of the Bible, is found an allusion to a substance which we imagine must have been glass. Next to this, Alexander Aphrodisius amongst the ancient Greeks, Lucretius, Flavius Vopiscus, and other Latin authors, have left us a correct description of glass. Aristophanes also alludes to glass in one of his plays, and Aristotle brings out two problems on the subject; the first, why is it we see through glass? the second, why can we not bend glass?

Admitting that these two propositions emanate from the celebrated philosopher, they appear to give conclusive evidence that glass was familiar to the Greeks.

But we may, perhaps, even trace the origin of this invention far earlier, and to the remotest period of the existence of man, by associating it with the art of making bricks, which was, it is believed, practised by the earliest inhabitants of the earth; and it is not difficult to imagine how such an art would originate.

Man was led, for his subsistence, to seek a mode of preparing animal food for his use by roasting it over the fire, and having, in course of time, built, rudely, a sort of oven made of earth, and the earth having become hardened through the action of the fire, our forefathers would soon discover all the advantages which might be derived from such a process for making bricks or pots, and utensils for common use. Specimens of the potter's art in ancient times we have in plenty, and in a variety of forms or shapes, which for elegance have not been surpassed. We need only allude to the Etruscan vases in the collection of the British Museum.

In firing bricks it will not unfrequently happen that some kind of vitrification takes place in the bricks placed in the hottest part of the fire, and one might naturally suppose that one process would lead to the other, but such does not appear to have been the case, at any rate, for many centuries. Later, horn and skins were in use down to the third or fourth centuries of the Christian era, and oiled paper or mica was also used in lieu of window glass, nearly up to the time of the reign of Elizabeth. If we are to give credence to the narrative of Pliny, to accident alone, as in many other instances, are we indebted for the discovery of glass. Some traders, being weather-bound, landed on the banks of a river in Syria, and began to prepare a place in the sand for cooking their meals, after having gathered for fuel a great quantity of an herb, known there by the name of *kali*, which plant must have contained a large proportion of carbonate of soda, and this being mixed with the sand, yielded, through the agency of the fire, a sort of vitreous substance. Such is one of the accredited versions of the origin of glass.

Glass has at all times, until recently, been thought a substance of great importance, and even amongst the primitive inhabitants of South America and of the Indian continent who were, when first visited by the early European navigators, found to possess gold and silver ornaments in abundance, it is well known that the first discoverers of those countries who happened to land in search of food or water, had no difficulty in obtaining from the natives gold in exchange for some valueless pieces of glass, or a few glass beads which they would immediately use as an ornament round their necks or their wrists. As late as the middle of the last century, glass beads of various descriptions and of all sorts of colours, were extensively manufactured in France, principally for exportation to the colonies of South America and the islands of the Pacific Ocean.

It may be said that although glass is an article of first necessity to us, it is at the same time one with the nature of which very few persons are well acquainted, and

the learned have even been often at variance as to the exact classification glass ought to belong to. It is not a mineral, since it has never been found in a primitive state in any country, neither can it be placed in the vegetable kingdom.

Glass has become with us an article so singularly cheap and common, that we are apt to lose sight of its immensely diversified qualities; but if only considered from a philosophical point of view, we shall find that few of the substances which we have in daily use, either in a simple or compound state, can be compared to glass in point of importance and of usefulness. Firstly, unlike any mineral, it is inodorous and clean to the fingers, and does not lose any of its weight by usage or wear; it is always transparent, whether in a cold or a red-hot state; it can take any shape whatever while in a state of fusion, and it retains it absolutely after it has cooled. It is capable of receiving the highest polish, and of taking any coloured tint, either on its surface or in its body; and it also has this peculiar and invaluable advantage that it does not retain the taste of any liquid or acid it may have contained; it is the most flexible of substances while in fusion, and becomes harder than any pure metal when once it has become cold; lastly, it is not liable to rust, nor to be consumed by fire.

The applications of glass are now so numerous that it is difficult to imagine any one branch of industry or of manufacture which could be carried on for a single day without the use of glass in one shape or another. To some of the most important amongst the sciences, such as chemistry, physics, astronomy, the use of glass is a matter of absolute necessity; and in proportion to the gradual and increasing requirements of these last-named sciences, especially astronomy, it will be found that the glass manufacturer has been obliged to perfect his mode of manipulation, and, by the aid of chemistry, has of late years obtained such magnificent results that the field for astronomical observation has thereby been considerably enlarged.

It appears that, although vessels made of glass had been in use for a considerable time previously, it was only about the third century of our era that glass began to be used for glazing windows. These consisted of an infinite number of small panes of various shapes, which were arranged so as to form certain designs for the ornamenting of windows in places of worship; glass having, on account of its rarity then, been almost, if not entirely, confined to that use.

St. Jerome, who wrote in the fourth century, speaks of glass in church windows; and Grégoire de Tours relates, two hundred years later, in the year 525, that a soldier of the army of the King of the Visigoths, which had invaded Auvergne, entered a church through a window, of which he broke the glass. Fortunatus, Bishop of Poictiers, towards the end of the seventh century, describes with admiration the painted windows of the Cathedral of Paris. St. Philibert, also in the seventh century, had the windows of the celebrated Abbey of Jumièges, on the banks of the Seine, near Rouen, decorated with glass.

At the beginning of the eighth century glass was unknown in England, and it was Wilfrid, Bishop of York, who died in 709, who first introduced glass into England, by sending for some glass-makers from France, according to a record kept to this day. A few years later, St. Bennet, Abbot of Wearmouth, wishing to decorate the windows of his monastery, sent for some glass-makers, also from France, for it appears, from some authentic records, that the art of decorating windows with glass was practised in several parts of France, especially in Normandy, long before it was adopted in other countries.

It would seem that the art of staining glass was very early discovered, although no date can be correctly assigned to the period when stained glass for church windows was first used. The practice generally adopted was to make a sort of mosaic design, by placing an infinite number of small pieces of coloured glass together. This was in use for several centuries before the art of painting on glass, properly speaking, was discovered, which seems to have soon extensively spread and to have been cultivated by many excellent artists, to judge by the numerous specimens still in existence on the continent. But for the 16th century, so rich already in artistic talent, was reserved the glory of carrying glass painting to a degree of excellence which has never been equalled since, and the names of Jean Cousin and Bernard de Palissy will be honoured for ever, amongst the large phalanx of glass painters in all countries. The most remarkable painted windows, perhaps, in this country, are the windows of the various Colleges at Oxford, which were executed during the 17th century by Bernard Van Linge and his pupils. William Price also repaired some of the glass paintings in Queen's College, Oxford, and in Christ Church painted a remarkable composition from the designs of Sir James Thornhill. Besides these may be mentioned the windows of Lichfield Cathedral, and several other very ancient windows in Christ Church, and especially in the residence of the Dean of Westminster, near the Abbey.

Having been, for many years, professionally acquainted with printing in connexion with the fine arts, and having observed the immense development the new art of photography has taken, and the large field it has opened for representing all sorts of subjects, of animated, as well as still life, it occurred to me that if a means could be found to print the photographic image on glass, as easily as it is done on paper, and through the agency of some chemical composition which would admit of employing ceramic or vitrifiable colours, and burning them in, a great result would be attained, and a new and considerable branch of industrial art might thereby be opened. Considering the numerous and various attempts which have, from time to time, been made to introduce a substitute for glass painting in the decoration of houses, I believe it can be said that a want was generally felt for supplying the growing taste for pictorial decoration; for glass painting is an expensive process, and requires also a considerable time to obtain a perfect result. There is a process known as lithophany, or transparent china, or biscuit slabs, which are now made, in Germany principally, and some very good specimens can be seen, but although any kind of subjects, on a small scale, can thus be represented, and with a very good effect, the slabs are heavy and thick, and can never come into use as a substitute for glass painting. Some few years ago, a new mode, which was then termed "potichomany," was introduced, which had for a short time very great success—I allude to the mode of pasting coloured prints inside a large glass bowl, or jar, and applying a thin layer of plaster of Paris, in a liquid state, so as to fix the paper firmly, and create an opaque back-ground, by giving substance to the whole, when seen from a distance. Some very good specimens of this were obtained, and it afforded for a time an agreeable occupation to many a young lady. Another mode has also been tried, and some very pretty results produced, by applying prints obtained by lithochromy, or lithographic printing in colours, on a pane of glass, and varnishing them at the back with copal or some such varnish; these will for some time resist the effects of the weather when placed in a window, and this is perhaps the nearest approach to glass painting in point of effect yet achieved, but practically it does not answer, for the varnish will not stand exposure to the weather from outside, and the constant cleaning glass requires, renders it liable to be injured, so that the design soon perishes.

In the mode which is now for the first time introduced, no such danger or liability need be feared, since the colour has been firmly fixed in the substance of the glass by fire, and, being composed of the same elementary materials, has become part of the glass itself, and can only be destroyed by the glass being annihilated by breakage.

In order that the process may be very distinctly understood, I shall now describe it by reading that part of my specification which relates to the placing the image on the glass, fixing it, and passing it through the fire.

This invention has for its object improvements in reproducing photographic and other pictures, engravings, prints, devices, and designs, on the surfaces of glass, ceramic, and other substances requiring to be fired to fix the same thereon.

For this purpose, I proceed in the following way:—A piece of glass, which may be crown or flatted glass, being selected as free from defect as possible, is firstly well cleaned, and held horizontally while a certain liquid is poured on it. This liquid is composed of a saturated solution of bichromate of ammonia in the proportion of five parts, honey and albumen three parts of each, well mixed together, and thinned with from twenty to thirty parts of distilled water, the whole carefully filtered before using it. The preparation of the solution, and the mixing up with other ingredients, should be conducted in a room from which light is partially excluded, or under yellow light, the same as in photographic operating rooms, so that the sensitiveness of the solution may not be diminished or destroyed.

In order to obtain a perfect transfer of the image to be reproduced, the piece of glass coated with the solution, which has been properly dried by means of a gas stove (this will only occupy a few minutes) is placed face downwards on the subject to be copied in an ordinary pressure frame, such as is used for printing photographs.

The subject must be a positive picture on glass, or else on paper rendered transparent by waxing or other mode, and an exposure to the light will, in a few seconds, according to the state of the weather, show, on removing the coated glass from the pressure frame, a faintly indicated picture in a negative condition. To bring it out, an enamel colour, in a very finely divided powder, is gently rubbed over with a soft brush until the whole composition or subject appears in a perfect positive form. It is then fixed by alcohol in which a small quantity of acid, either nitric or acetic, has been mixed, being poured over the whole surface and drained off at one corner.

When the alcohol has completely evaporated, which will generally be the case in a very short time, the glass is quietly immersed horizontally, in a large pan of clean water, and left until the chromic solution has dissolved off, and nothing remains besides the enamel colour on the glass; it is then allowed to dry by itself near a heated stove, and when dry is ready to be placed in the kiln for firing.

It may be stated that enamel of any colour can be used, and that by careful registering, a variety of colours can be printed one after the other, so as to obtain a perfect imitation of a picture; also that borders of any description can be subsequently added, such as those shown in the specimens on the table, without any liability to remove or even diminish the intensity of the colour in the first firing.

It will be easy to perceive that this mode of obtaining an image on glass, in an absolutely permanent substance, and of any description, colour, or size, may prove of considerable advantage and utility for the decoration of private houses, and also for public buildings. Now that, by means of the photographic art, the most correct views of any object or of any building or scene—even portraits—can be faithfully and easily obtained; when we see every day the results of the labours of photographers in all parts of the world, in the shape of beautiful prints; when we can be made acquainted, without leaving home, with the actual costume, habitations, scenery, manners almost, of all countries, for instance, China and Japan, which have but recently opened their doors to European civilisation; when, through the same means, we are able to see, for the first time, and the learned are able to translate from, the graphic reproduction with which photography furnishes us of those early inscriptions engraved on the rocks in Asia, and by the Egyptians on their splendid monuments, I need only point out the usefulness of the mode of fixing those images, in an indelible mannner, for ornamental as well as for scientific purposes.

In large cities, like London, where houses are built so close to one another, in how many places may not the process become available, by enabling anyone to introduce, for a very moderate expense, pleasing or instructive images where common plain ground glass is now used, to shut out the sight of a disagreeable object, a dead wall, or an unpleasant neighbour, without diminishing the amount of light more than is convenient.

In the library, fitting subjects might be introduced on the windows by a judicious selection of the portraits of favourite authors, or of famous scenery at home or abroad. In the dining room, also, appropriate pictures could be selected, such as flowers, fruit, or game subjects, so disposed as to harmonise with the decoration of the room. Even for domestic purposes, for lamps, or screens, or any object in glass, the process will be found useful, especially on account of its rapidity, which will enable the manufacturer to execute and to deliver an order at a very few days' notice.

DISCUSSION.

Mr. HARVEY inquired whether the method now employed for colouring daguerreotypes was applicable to the process just described, provided the colours used were such as to stand the firing.

M. JOUBERT replied in the affirmative—mineral colours being used instead of vegetable colours, as in the case of photographic colouring. The difference between the two was this:—Where they applied the colour to a photograph, or drawing upon paper, the colour remained as applied; but any one acquainted with glass painting knew that various colours were acted upon differently under the action of heat in the firing. For yellow colour they used a preparation of silver and copper, and minerals were used more or less in the preparation of all the colours for burning in. If the colours were applied by the brush, as in the colouring of daguerreotypes, the process amounted, in fact, to that of glass painting, properly speaking, instead of its being a mechanical process as this professed to be. His (M. Joubert's) object had been to bring this invention to a purely mechanical result, so as to obviate the necessity of employing artists for glass painting. The object of the invention was to reproduce photographs or designs in a perfect form by mechanical manipulation.

Mr. PHILIP PALMER would express his obligations to M. Joubert for having brought forward this subject of window glass. Important as the subject was, within the last few years it had seldom been brought before the attention of this Society. It was now thirty years since he became a member of the Society, and he recollected that at the first meeting he attended the subject was that of window glass, and he believed the same subject had only been brought before them two or three times since. The Great Exhibition of 1851 afforded an opportunity for bringing this subject forward, and the approaching Exhibition of 1862 would, he hoped, probably furnish another occasion for doing so. With regard to the antiquity of glass, he might mention that in the British Museum there was a specimen of glass said to be of a date 3,000 years before Christ. Whether that was the fact or not he did not know, but it was certain that some very old specimens of glass were to be seen in the British Museum. He quite agreed with the remark in the paper, that glass was so cheap and common that they were apt to lose sight of its immensely diversified qualities, and, therefore, any attempt to ornament it in this beautiful and artistic manner deserved the strongest encouragement of all lovers of art. There was a period in the history of the importation of painted glass which was personally interesting to himself, and which was spoken of by Horace Walpole. It was matter of history, but was connected with his (Mr. Palmer's) great-grandfather, who imported large quantities of painted glass in 1753-4, and the circumstance gave rise to an amusing chapter in Walpole's letters. With regard to the cost of glass painting, he did not know

that that was a subject which he ought to touch upon in the presence of several eminent glass painters whom he saw in the room, but he might venture to make this general remark—that a really good work of art must be well paid for; and if they employed first-rate talent, whether in painting upon glass or in architecture, that talent must be paid for; and glass painters were quite as much artists as those who painted upon canvass or paper. With regard to the decoration of glass at a moderate expense for the purpose of shutting out the view of dead walls, or a disagreeable neighbour, M. Joubert had contrasted this process with the use of plain ground glass. That had been used for a great many years; enamel patterns had been produced in such immense quantities that the use of the latter had been much larger than that of plain ground glass. The patterns had become so common that architects were always seeking for something new. This process, as it appeared to him, was calculated to supply that want, inasmuch as it enabled persons to select any number of subjects and have them reproduced. Having been connected, as he and his family had been, for a century and a half with the glass trade, he wished to express his acknowledgments to M. Joubert for having brought this subject before them; and he would add that he was quite sure all who were interested in the trade would be happy to give him the support which his ingenuity deserved, and to assist in bringing before the public this very beautiful invention.

Mr. Peter Graham would ask one or two questions of a practical nature. First, what was the largest surface to which this process had yet been applied, and whether there was any limit to the surface, and how many colours could be used in combination in one picture. Also, whether there was any difficulty in employing a number of colours in combination, so as to produce a highly artistic effect; and, further, to what extent photographs could be enlarged or diminished, to bring them to such a size as might be required. He thought the invention might be applied to decorative purposes with good effect. He would also inquire what was the cost of these specimens, as compared with paintings upon glass of the same size, and whether many failures were experienced in the attempts to produce these pictures?

M. Joubert replied, with regard to the size, that the specimens he had exhibited, as being unburnt, 24 × 17½ inches, were the largest he had yet produced, but he apprehended the size was only limited by the dimensions of the kiln. There would, of course, be a little more care required in manipulating upon a large picture, but there would be no difficulty in producing a picture of three or four feet square. The only difference was the greater risk in burning it; the larger the surface of glass to be subjected to any manipulation or firing, the more the risk was increased. As to the combination of colours, if he understood the question aright, it was what combination of colours could be burnt at the same time. That was a question which he was scarcely in a position to answer with certainty at present. In the specimens upon the table, it would be observed that they were almost all of one colour. He thought it better to produce them perfectly in monochrome in the first instance, and having mastered the difficulties of manipulation in one colour, then to go to three or four colours. He would call attention to one specimen, having a coloured border with an edging which had the appearance of ground glass. It was, however, produced by a coating of flux. The coloured border was also added, and was burnt in at the same time with the white enamel—all in one firing—showing that a colour and white enamel could be accomplished at the same time. He had been able to produce four colours in one burning. He had no doubt, with improved manipulation, a variety of colours could be produced at one firing; but all glass painters were aware that to attempt to produce perfect copies of pictures, with all shades of colours, would be to branch into another line of art. Instead of being mere printing, it would become regular glass painting. It had been his object to avoid that from the first. Glass painting was executed very beautifully in this country, and upon that subject he might remark that an art which flourished 200 hundred years ago seemed to have fallen into disuse for the last 100 years, and it was only at the beginning of the present century that glass painting had seemed to have revived. Although glass painting was not invented in England, he might say that this was the country in which that art had been kept alive more than in any other. The third question asked by Mr. Graham was with respect to the size to which pictures could be enlarged or diminished. The camera was the instrument employed both for enlarging and reducing. The enlarging of designs through the camera was practised in Paris more extensively than in this country. In a short time there would be an exhibition here, in which objects would be shown as large as life. This process was in operation at present in Paris, but a large apparatus was now being prepared for introducing it into this country. They were aware that any photograph or drawing enlarged beyond a certain point was not pleasant to look at; and in proportion as a large picture diminished it acquired finish, while, on the other hand, enlargement beyond a certain degree exaggerated the defects of the picture. With regard to the cost of these specimens as compared with ordinary glass painting, it was difficult to give an answer to that question, because there was no fixed price for glass painting with which it could be compared. The operations of the glass-painter were exposed to many accidents. A work which had occupied weeks or months might spoil in the last firing; therefore the risk, being so considerable, was one reason why the price of glass painting must be arbitrary. Taking the average of the smaller specimens exhibited, he believed they could be sold at about 8s. per square foot. It was found necessary to fix the price according to measurement. If an architect had 100 square feet to cover he must be able to estimate the cost without entering into the question of subject. He (M. Joubert) had no doubt when this invention was taken up generally by the manufacturers the cost would be very considerably reduced. With regard to the failures he had met with, if he mentioned the number of failures he experienced at the beginning, he should do a wrong thing, because in the early stage of an invention failures were frequent. Comparing the failures of the last three months with those that occurred two years ago, he might state that they were now only 1 per cent., whilst formerly they were as much probably as 50 per cent.

Mr. Phillips understood Mr. Joubert to state that this process could be applied to ceramic bodies. He begged to inquire whether it was equally applicable to china as to glass, and in that case could it be applied to any description of form, as well as to a flat surface?

M. Joubert replied that in the specification of his patent he had included ceramic substances as being part of the invention. He had already shown, to a few friends, some successful specimens of the application of this process to china; but he found that one branch of the subject at a time was quite enough to occupy his attention. He had chosen between the two and had worked upon glass in preference; but that being now, as he considered, brought into good working order, his intention was to apply himself now to developing the invention with respect to china, because he was not only convinced that it would answer, but that it was possible to apply it to curved surfaces as well as to flat surfaces.

Mr. Gee inquired whether these subjects were liable to injury from external exposure to the weather or from the ordinary rubbing in the operation of cleaning glass?

M. Joubert replied, that the picture, forming an integral portion of the glass itself, could not be injured from the causes mentioned.

Mr. Gee, with reference to the applicability of the process to convex surfaces, inquired whether the subjects were not liable to distortion?

M. Joubert, in answer to that, would state, that an

eminent photographer was about to introduce a method of printing photographs upon curved surfaces. He had seen some of those impressions which left no doubt upon his mind that his process would be applicable to all forms of glass or china. The subjects would not be distorted.

Mr. BISHOP remarked, that when he was at Pompeii about two years since, he was shown a piece of plate glass about three-sixteenths of an inch in thickness, which was the earliest specimen of plate glass he had met with.

M. JOUBERT was aware of the fact just mentioned, but there seemed to be some difficulty in establishing the fact that it was really glass. Some learned persons considered it was not glass, but merely a piece of transparent slate or mica that was used in ancient times, which, through the agency of fire, when those cities were invaded by lava, had assumed the appearance of glass. It was a great question whether it was glass.

Mr. BISHOP said that that might have been the case as regarded Herculaneum, which was covered with melted lava, but in the case of Pompeii it was covered with wet cinders and mud, and therefore no vitrification could have taken place. The specimen to which he alluded was about one foot by nine inches; he had carefully examined it, and should pronounce it to be glass, resembling as nearly as possible the material of the present day known as cast plate glass.

M. JOUBERT had not seen the specimen alluded to by Mr. Bishop, and could, therefore, give no decided opinion upon it; he could only judge from the reports he had heard from other persons. A distinguished glass manufacturer (Mr. Chance) read a paper before this Society some years ago, in which he stated that glass had been found in the ruins of Pompeii. Upon reading that, he (M. Joubert) was somewhat startled at the assertion, because he was intimately acquainted with persons who had travelled there, and who had made this subject matter of special investigation, but they had told him it was very doubtful whether it was glass at all. He should not like to decide against the opinion of a gentleman who had seen the thing itself, as his opinion was founded entirely upon the statement of others.

Mr. B. WATERHOUSE HAWKINS said as M. Joubert had submitted to his catechism with so much patience, he begged to trouble him with one more question. As he had included ceramic manufactures in the category of materials susceptible of receiving the benefit of this wonderful invention. he (Mr. Hawkins) would ask whether he had taken into his consideration the possibility of applying this beautiful process to the cheap decoration of ceramic ware, porcelain, and ordinary pottery, so that they might ultimately hope for the banishment of the "willow pattern," and the substitution of varied and more artistic patterns produced by photography, and whether there was a probability of their being so cheaply produced as that they could be multiplied in the same manner, and nearly as cheaply as the present mode of printing upon biscuit.

M. JOUBERT would be glad if he could candidly say that he even saw, looming in the distance, a prospect of applying this process to the displacement of the old willow pattern upon our crockery, but at present he did not think there was much prospect of this, and for this reason: —these pictures were all printed photographically, and every one knew that the process was not very rapid, the operation being liable to be more or less influenced by the state of the weather; but he was quite confident that some day or other the present mode of printing, which was applied to photography generally, would be superseded by the discovery of a mode of producing a perfect metal plate, engraved by means of photography itself. When that was accomplished, no doubt one of its first practical applications would be to the patterns of pottery wares, and they might then have a chance of bidding adieu to the willow pattern for ever.

Mr. WM. HAWES did not rise for the purpose of putting more questions to M. Joubert, but if he were inclined to make an observation upon the very able paper they had heard, and the discussion which had followed upon it, it would be to express the great satisfaction they must all have felt at the manner in which the various inquiries had been replied to by M. Joubert. They must have arrived at the conclusion, from what they had heard, that here was a new application of one of the newest and most recent discoveries connected with the art and industry of the present day. Photography, a young art, was applied in a new form, and with great facility, to produce most beautiful effects; and they had been told with a degree of fairness and candour which made them feel satisfied that every word was true, that in the experience of only two years so great a proficiency had been attained, that, whereas the failures were formerly fifty per cent., they were now reduced to not more than one per cent. They had also been told, incidentally in the discussion, that the art of painting upon glass had fallen into neglect for a considerable period in this country, but had again progressed within the last few years. It was about 120 or 130 years ago that the excise was put upon glass. The effect of that interference was to check the application of glass to the most beautiful purposes of domestic life. About 100 years ago the art of painting on glass relapsed, and had only recently revived. It was singular that that should be just about the time when the excise was put upon glass. If that fact was incorrect, his reasoning would fail; but he deduced this conclusion from it—that this was another instance that where there was entire freedom of a manufacture from fiscal imposts, men like M. Joubert could study and experimentalise at comparatively little cost, whereas, if the law put a high duty upon this material, the cost alone would almost have prevented the advancement of such an invention as this. No one could doubt that if M. Joubert could produce designs of this kind, at a cost of 8s. per foot, in the present stage of the invention, in a few years time they would be produced at a price which would bring them into common use. It only wanted more practice, more experience, and manufacture on a larger scale, to reduce the present price of 8s. to almost a nominal sum. The photograph itself was almost costless; the skill was in the transferring of it. This beautiful invention, he had no doubt, would in a short time become an important element in the ornamentation of their houses. With regard to the probability of this invention ever superseding the willow pattern, he believed, in point of economy, that would hardly be achieved, because the printing such designs as the willow-pattern was the cheapest process that could be conceived or introduced. As a member of the Council he begged to express his thanks to M. Joubert for bringing a subject of this kind so ably before them. Generally speaking, he had a strong objection to patentees making use of this Society as a means of disseminating their own views with regard to their own patents. But this was an extraordinary case. Here was not only a patent brought before them, but a beautiful and novel application of art, and it was the duty of this Society, whose main object was to encourage the arts, to give an opportunity of bringing it thus before the public, especially when it was brought forward with such candour as had been shown on the present occasion.

Mr. PHILIP PALMER apologised for his interruption of Mr. Hawes's remarks, with which he agreed, except as to the excise duty upon glass having stopped the art of painting upon glass. M. Joubert had not hinted at such a thing, and he was afraid his friend Mr. Hawes had adopted the popular opinion as to the effect of the repeal of the duty on glass. If the repeal of that duty had done anything, it had had the effect of making the manufacture of glass a monopoly instead of an open trade. At the time the duty on glass was repealed, there were twenty manufacturers; at the present time there were only six. A much larger quantity of glass was produced, but six houses were sufficient to manufacture what was formerly

produced by twenty. The question of the value of glass, in his opinion, had very little to do with the cost of producing these pictures. A piece of glass which now cost sixpence or ninepence, was not worth more than double that sum when the duty was in existence, so that previous to 1845, M. Joubert could have produced his designs at the same cost plus the extra price of the glass at that time compared with the present. He could not consider that the imposition of an excise duty upon glass had had the effect of checking the art of painting on glass, but he rather attributed the disuse spoken of to the want of taste of the period. They knew in what a low state the arts were in this country a century ago, and it was only right to say that this Society was one of the means of keeping alive a taste for art.

M. Joubert, in mentioning the average price of 8s. per square foot, wished it to be understood that the remark applied to the smaller specimens on the table. With reference to what had fallen from Mr. Hawes upon the subject of the duty upon glass, he (M. Joubert) would say that he so far concurred in what that gentleman had said, that if glass had been as expensive now as it was before the repeal of the duty, he did not think he should have ventured to engage in this process at all.

Mr. Hawes further remarked that this was not the place to enter upon an argument as to the effects of the repeal of the duty upon glass. There might have been 20 manufacturers before the repeal, and there might be only six now; but if the six could now do that which the 20 did before, the public were no losers by that circumstance. To adopt Mr. Palmer's reasoning was to go back 20 or 30 years in their commercial policy. They had before them the fact just stated by M. Joubert, that if the experiments which had led to the perfection of this process had had to be performed upon an article bearing a high excise duty, the cost of the experiments would have been such as to have deterred him from undertaking them.

The Chairman said the agreeable duty now devolved upon him of expressing, not only his own views, but he believed the views of the meeting at large, upon the beautiful and novel invention which had been brought before their notice that evening. They sometimes saw decorations of windows which, though beautiful within, had a very unsightly appearance from the outside; but here they had both sides equally beautiful. It was an invention of a peculiar kind. It was pure photography applied to glass, with this addition, that it was burnt into the substance of the glass and became as durable and indestructible as the glass itself; and this he apprehended constituted one of the chief merits of the invention. It would enable them, he trusted, before long, to obtain copies of beautiful pictures for decorative purposes at comparatively small cost. They would not have to form the designs themselves, or to employ expensive artists to execute them; but by the aid of the photographer they might have reproductions of the works of Raphael, or even actual scenes from nature. There was one specimen in particular to which he would call their attention. It was a scene of some Frenchmen reading a proclamation in Paris during the late Italian war. In this way portraits of friends might be employed in the ornamentation of their dwellings. It was the combination of the two great arts of photography and enamelling. It had this superiority over paper photographs; a strong suspicion prevailed that photographs would not last for ever, that the effects produced by the action of light might be destroyed by the light; but by this process the impression was rendered as durable as the glass itself. He was sure the feeling of the meeting would be with him when he expressed the gratification which this novel and interesting application of the photographic art had afforded them. He entertained the highest sense of the value of this paper; but what enhanced its value were the answers given by M. Joubert to the many inquiries which had been put to him. He did not over-answer the questions, but when he dealt with matters which were more subjects of surmise than of actual experience, he replied with a modesty and talent which carried with it, to his (the Chairman's) mind, a perfect conviction of his sincerity, as well as of his practical ability.

The vote of thanks having been passed,

M. Joubert returned thanks for the kind manner in which his paper had been received. He could not allow this meeting to separate without conveying to every person present, as far as he was able to do so, his extreme feeling of gratification for the manner in which he had been received as a stranger in this country, and especially in this Society, since he had had the honour of being a member of it. If bringing this invention before them, which had cost him some labour and anxiety to perfect, had been the means of ministering to their gratification and enjoyment, he felt he was only attempting to repay the debt of gratitude which he owed to the people of this country.

The Paper was illustrated by a great variety of beautiful specimens of the invention.

The Secretary announced that on Wednesday next there would be no meeting of the Society, but that on Wednesday, the 5th of June, at half-past eight o'clock, a Paper, by Mr. Wm. Hawes, "On the International Exhibition of 1862," would be read. On this occasion His Royal Highness the Prince Consort, President of the Society, will take the Chair. *Members only will be admitted to this meeting.*

FEMALE SCHOOL OF ART.

An Exhibition of Water-colour Paintings, from private collections, illustrating the History of the Art; and of Works by Female Students of the Schools of Art, showing the course of instruction, will be opened on Saturday, the 1st of June, at the House of the Society of Arts, John-street, Adelphi, the Council having placed the Society's Great Room at the disposal of the Female School of Art for this purpose.

The admission to the Exhibition will be one shilling, and the proceeds will be appropriated to the fund now raising for a building for the Female School of Art.

The Exhibition will be open daily, from ten a.m. to six p.m., and will close on Saturday, the 15th June.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The thirty-first meeting will be held in Manchester, September 4th, 1861, under the presidency of William Fairbairn, Esq., LL.D., F.R.S.

The Local Sub-Committee of section A (Mathematics and Physical Science) for the ensuing meeting of the British Association at Manchester, considering that an Exhibition of Telegraphic Machinery, illustrating its gradual development, would prove at once interesting and instructive, has determined, if possible, to arrange such an Exhibition. With this view the Committee are seeking, from those connected with this subject, contributions of instruments, batteries, or specimens of insulation, &c., showing the history, progressive improvements, and present condition of telegraphy. Persons willing to assist the Committee are requested, at their earliest convenience, to forward a statement of what instruments or specimens they would be disposed to contribute.

It is proposed to illustrate the practical working of the various instruments by opening communications on one evening to the principal cities of this country and the Continent—say to London, Aberdeen, Dublin, Cork, Berlin, Vienna, &c.; and the Committee will be glad to know upon whom they may depend for aid in establishing these communications, and to what places it may be

desired to work through special wires to be extended to the Free Trade Hall, and what amount of accommodation will be likely to be required in the building.

Portraits of men eminent in the science of telegraphy, photographs of telegraphic works, or apparatus—in short, anything calculated to increase the interest of the Exhibition, will be gladly received by the Committee.

Communications should be addressed to R. B. Clifton and Thomas Heelis, the Hon. Secretaries of the Section.

ARTISTIC CONGRESS AT ANTWERP.

An Artistic Congress will be held at Antwerp, on the 19th and 20th August next, in the Council-room of the Cercle Artistique Littéraire et Scientifique, to which Artists and Literary Men of All Nations are invited, under the Presidency of M. J. F. Loos, President of the Cercle, Burgomaster of Antwerp and Member of the Belgian Chambers.

The following is the programme of the proceedings:—

QUESTIONS OF MATERIAL INTERESTS.

The establishment of an International Legislation for the Full Suppression of the piracy of Works of Art.

1. The Artist who has created a Work of Art, has he alone the right to authorise its reproduction, whether by means similar to those which he has employed, or different from them ?

2. What means shall be employed in order to protect an Artist against the fraudulent imitations of his Works ?

3. What measures shall be taken against the placing of a false signature upon Works of Art ?

4. Shall the repressive laws concerning the violations of Artistic property, be applicable to Art when applied to Manufactures ?

5. By what means can a good understanding be established between Governments in order to the general recognition of Artistic property ?

QUESTIONS OF ARTISTIC INTERESTS.

1. Is the expression of Monumental Art in harmony with the manifestations of modern ideas ?

2. Is not the union of Architecture, Sculpture, and Painting indispensable to Monumental Art? What reforms should be introduced into the mode of instruction in the Fine Arts, in order to establish that union ?

3. Is it not in the union of Architecture, Painting, and Sculpture, that Monumental Art should find the elements of a new style, which ought to characterise our epoch ?

QUESTIONS OF PHILOSOPHICAL INTERESTS.

1. What affinity exists between Philosophy and Art ?

2. Does not Art exert a certain influence upon the intellectual and moral development of nations ?

3. What influence can be attributed to modern ideas upon contemporary art? Does our epoch possess any new principle which may give to the Fine Arts a new expression and direction ?

4. If Art, expressing contemporary ideas, must contain their symbol, what kind of Works will best reach that end ?

All communications in reference to the Congress should be addressed to the Committee of Organisation, as above.

Home Correspondence.

MR. MACGREGOR'S PAPER ON THE HYTHE SCHOOL OF MUSKETRY.

SIR,—The very able paper read by Captain MacGregor, on the 15th inst., "On the Hythe School of Musketry Instruction in Rifle Shooting," was so complete an exposition of the system practised at that very efficient establishment, that little could be said in the way of discussion; and Lord Elcho, who so ably presided on the occasion, limited the discussion so closely to the subject of the paper, that, although I attended with the view of making a few remarks upon a subject intimately connected with the present crisis, and more particularly with the Volunteer Rifle movement, I did not consider that I ought, under the circumstances, to obtrude my remarks upon the meeting.

The great improvements which have been made during the last few years in the construction and use of common and small arms, by Sir William Armstrong, Whitworth, and others, will most unquestionably revolutionise both the science and the practice of war. War will henceforward become "fast and furious," hot and short-lived, or it will become more cautious, more scientific, and more a war of position than formerly. Temporary field-works will consequently be more exensively employed, so that a navvy's spade, if judiciously directed and well handled, will become at least equal to two rifles. This circumstance will add much more to the defensive powers of England than it will tend to the advantage of her invaders.

The increased range—the increased penetration—and the marvellously increased precision of the Armstrong cannon—and the destructive nature of his projectiles, renders the existing type of fortification almost useless, and it is questionable whether it is not a waste of public money to expend it in rearing masses of brickwork, which can be so easily disposed of by the new weapons of destruction.

Some ten or twelve years ago, when there were apprehensions of an invasion, I proposed to a high military authority that the whole of the English coast (the southern coast in particular) and the several routes which an invading army would take, from the point of debarcation, in marching upon London, should be carefully reconnoitred, and works designed of a nature adapted to the several defensive positions thus selected, where a temporary resistance would be offered to impede the advance of an invader, or where a more determined stand would be made. These selected positions to be marked on the Ordnance one inch map, and numbered, the numbers having reference to more detailed plans of works suitable to the several defensive positions.

These works were proposed to be of a temporary nature, such as could in most cases be thrown up in a few hours, and in all cases in a few days, provided the proposed previous arrangements had been carried out to such an extent as to prevent delay or confusion when the threatened alarm was given.

The works thus proposed to be selected, and their position marked on an ordnance plan, would principally consist of intrenchments upon the crests of the chalk-ridges, scarping the more precipitous portions of these ridges; lines of abattis, in favourable positions, where materials could be readily obtained; and a variety of other contrivances, which would render one man equal to ten men.

The siege of Sebastopol has given an increased *prestige* to earth works, as compared to works composed of masses of masonry.

Temporary field-works would also be extremely useful, indeed essentially necessary, to give confidence to troops who have not had sufficient experience to act in considerable numbers. Some protection of this kind would be indispensably necessary, in order to give to the Volunteers that confidence which the regular army derive from the promptitude and steadiness with which they act in considerable bodies, and the support which every portion of an army in the presence of an enemy expects to receive from every other portion, in the event of being outflanked or overwhelmed by numbers.

Suppose, by way of illustration, that an intrenchment, affording ample protection, and a rest for the rifle, is thrown up on the crest of a ridge, and occupied by 1,000 Volunteers, and that a body of 5,000 men is seen advancing at a distance of 1,000 yards. The first-class shots (say 50 out of the 1,000) would commence firing at that distance, and by being supplied with rifles ready loaded, and firing from a rest, would be able to make a favourable

impression, at all events to amuse the enemy until he arrived within the effective range of the second-class marksmen, and so of the third-class, until about the range of 400 yards the whole would open a steady, well-sustained fire, and there can be no doubt but that the intrenched 1,000 Volunteers would be able, in close combat, to give a very good account of the fragment of the foe who would arrive at the intrenchment. And if an abattis, or any obstruction which would cause a delay of three or four minutes within 100 yards' range of the intrenchment were constructed, even that fragment would be disposed of.

Every Volunteer officer, and those of the non-commissioned officers and men who can afford the time, should make themselves acquainted, at all events theoretically, with the general principles of field fortifications. This might be done, to a considerable extent, by lectures, well illustrated by diagrams and models.

There is one mysterious department of the Government which ought to be especially looked up at the present crisis—that is, the Survey Department.

The National Surveys were commenced, about eighty years ago, with the view, principally, of producing a military map of the country, and it may be doubted whether there is any efficient military map of the country in existence at the present moment; and without a good map it is impossible to ascertain the defensive positions to advantage. The six-inch skeleton map of London has had the hill-shading added to it, and if published would be so far a useful map, but from some mysterious cause it is not on sale. What the authorities are doing with reference to the formation of a military map of the country, and why the hill-shaded map of London, already completed, is not on sale, are questions which should be put to the House of Commons by some independent member, and which should be answered for the satisfaction of the country. I am, &c.,

ALEXANDER DOULL.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Geographical, 1. Anniversary.
British Architects, 8.

Tues. ...Royal Inst., 3. Mr. John Hullah, "On the History of Modern Music."
Civil Engineers, 8. Continued discussion on the "National Defences."
Medical and Chirurg., 8½.
Zoological, 9.

Wed. ...Royal Soc. Literature, 4½.

Thurs...Royal Inst., 3. Mr. Pengelly, "On the Devonian Age of the World."
Royal, 8½.
Antiquaries, 8½.

Fri.......United Service Inst., 3. Captain C. P. Coles, "The Great Revolution which must ensue in our National Defences in consequence of the introduction of Iron-cased Ships."
Royal Inst., 8. Dr. W. V. Waller, "On the Nutrition and Reparation of Nerve."

Sat.......Actuaries, 3. Anniversary.
Royal Inst., 3. Prof. Max Muller, "On the Science of Language."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, May 71th*, 1861.]

Dated 11th January, 1861.

78. M. C. E. Page, Valdoie, near Belfort, France—An improved kneading machine.

Dated 18th February, 1861.

400. E. F. Barnes, New York—Imp. in instruments, or a combination of conductors and attachments for transmitting and recording messages, in any form of letter or character, by means of electricity or electro-magnetism, acting either mechanically or chemically, and which invention may also be applied to the transmitting or copying figures as maps of any form of outline.

Dated 9th April, 1861.

872. J. Higgins and S. Whitworth, Salford, Lancashire—Imp. in machinery or apparatus for preparing cotton and other fibrous materials for spinning.

Dated 13th April, 1861.

910. A. F. Delannoy, Paris—Imp. in boxes and bearings for lubricating the axles and journals of wheels, also applicable to lubricating the shafts or axles of machinery in general.

Dated 19th April, 1861.

962. P. Mingaud, 42, Rue Laffitte, Paris—Imp. in obtaining jellies, syrups, and drinks, from the tree Arbutus Unedo or Arbousier.
964. I. Riley and T. C. Wolstenholme, Blackburn—Imp. in heating apparatus for domestic and other purposes.
975. J. Gjers, Middlesbro'-on-Tees, Yorkshire—Imp. in the construction of machinery or apparatus for obtaining motive power.

Dated 23rd April, 1861.

1004. T. Peters, Great Alie-street, Whitechapel—Imp. in machinery or apparatus for moving, conveying, transporting, or transmitting bodies.

Dated 24th April, 1861.

1020. G. D. Davis, 3, Bromley-terrace, Saint Leonard's-road, Middlesex, and J. Davis, 20, Archer-terrace, East India-road—Imp. in machinery for raising anchors, stopping cables, preventing cables from riding, and other like purposes.
1022. J. Rhodes, Morley, near Leeds, and R. Kemp, Leeds, Yorkshire—Imp. in rag machines.

Dated 25th April, 1861.

1030. T. Taylor, 7, Wellington-row, Bethnal-green, Middlesex—Imp. in machinery for cutting certain fabrics into strips.
1040. E. Strangman, Waterford, Ireland—An improved method of, and apparatus for, intercepting and carrying off the sewage of large towns, and preventing the defilement of rivers thereby.

Dated 30th April, 1861.

1077. H. J. T. Labat, Bordeaux, France—An improved apparatus for hauling ashore ships and vessels of all sizes and descriptions.
1079. J. Meyer, Manchester—Certain new chemical combinations, and for the application thereof to fixing aniline and pigment colours in printing and dyeing, to tanning, waterproofing, and other industrial purposes. (A com.)

Dated 1st May, 1861.

1081. W. Horn, 3, Butler's-terrace, Ossory-road, Old Kent-road—Imp. in steam and water tight joints for fixing tubes in plates, such as are used for surface condensers, distillers, refrigerators, vessels for heating feed water or tubular boilers. (A com.)
1085. F. J. Bramwell, 35A, Great George-street, Westminster, and W. Owen, Phœnix Iron Works, Rotherham—Imp. in the manufacture of rails, bars, plates, cylinders, vessels, axletrees, cranks, wheel tyres, and other articles of wrought iron or steel, and also in the machinery used in such manufactures.
1087. F. Z. Roussin, 29, Boulevart St. Martin, Paris—Colouring matters derived from napthalamina, dinitro-napthalina, and trinitronapthalina, and application of such coloring matters to the dyeing and printing of fabrics.
1088. W. Browning, St. John-street, West Smithfield, Middlesex—A new method and apparatus for ascertaining the distance of distant objects.
1089. T. Hooman and J. Maliszcwski, 490, New Oxford-street—Imp. in photographic printing upon the interior of any glass or other transparent vessel.
1090. J. E. F. Ludeke, Marke, Hanover—Imp. in motive power engines.
1091. A. McNeile, Liverpool—Imp. in the construction of targets.
1093. W. Walton, Ivy-cottage, Old Charlton, Kent—A new manufacture of overlapping wall facing.

Patents Sealed.

[*From Gazette, May 17th*, 1861.]

May 17th.

2837. O. Vandenburgh.
2841. T. T. Macneill.
2847. J. Marland.
2854. J. Howden.
2870. W. Manwaring.
2873. J. Anderson.
2881. A. A. Dalglish.
2884. C. R. N. Palmer.
2891. W. Leigh.
289. J. Abraham.
593. J. Jacob.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, May 17th*, 1861.]

May 13th.

1079. A. M. Dix.
1090. J. Macintosh.

May 14th.

1115. J. Bottomley and A. H. Martin.

[*From Gazette, May 21st*, 1861.]

May 16th.

1101. H. Curzon, jun.
1166. C. F. D. Monnin.

May 17th.

1092. J. H. Johnson.
1122. J. Hesford.
1135. J. Apperly & W. Clissold
1174. F. A. Gatty.

May 18th.

1159. W. Harding.
1169. G. Alton and J. Firnie.
1194. G. H. Bevill.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, May 21st*, 1861.]

May 18th.

1129. R. Crosland, W. Holiday, and J. Heaton.

Journal of the Society of Arts.

FRIDAY, MAY 31, 1861.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £407,350, have been attached to the Deed.

GUARANTEE FUND FOR THE EXHIBITION OF 1862.

The following additions have been made since the last announcement, in the *Journal* for May 10 :—

*** *The name marked with an asterisk is that of a Member of the Society of Arts.*

NAMES.	AMOUNT.	REPRESENTING THE OBJECTS OF THE SOCIETY—ARTS, MANUFACTURES, AND COMMERCE.
Neilson and Co., Hyde-park Locomotive Works, Glasgow	300	Manufactures.
John Levy, 9, Orchard-place, Southampton	250	Arts.
Somers Clarke, 57, Regency-square, Brighton	100	Arts.
*Walter Hall, 10, Pier-road, Erith, S.E.	200	Arts.
*Frederick North, M.P., Hasting's Lodge	250	Arts.
J. Stanley Lowe, 31, Corn Market-street, Oxford	100	Commerce.
Thomas C. Allin, 23, Onslow-square, S.W.	100	Arts.
*George G. Adams, 126, Sloane-street, S.W.	100	Arts.

By Order,

P. LE NEVE FOSTER, *Secretary.*

INTERNATIONAL EXHIBITION OF 1862.

Her Majesty's Commissioners have appointed the following Committee in addition to those already published in the *Journal:*—

In connection with Class 12 (Naval Architecture and Ships' Tackle): Captain Frederick Arrow, Trinity House; Rear-Admiral C. R. D. Bethune, C.B.; Capt. Mark C. Close, Trinity House; Captain Richard Collinson, C.B.; Captain E. G. Fishbourne, C.B.; John Laird, Esq., Birkenhead; Captain Sir Frederick Nicolson, Bart., C.B.; Captain M. S. Nolloth; Captain Washington, Admiralty; and Clifford Wigram, Esq., Blackwall.

The Commissioners have received information that the following arrangements, in addition to those already published, have been made in foreign countries to represent the interests of intending Exhibitors :—

BREMEN.

A Joint Committee of the Chambers of Commerce and Trades; Dr. Victor Böhmert, Syndic of Chambers of Commerce, nominated to conduct correspondence.

SWEDEN AND NORWAY.

Chas. Frederick Woern, Merchant, of Gottenburg, will act as Commissioner.

A preliminary meeting was held on Tuesday, 28th May, in the Parlour of the Mansion House, for the purpose of advising in what way the formation of trades committees can be most efficiently submitted to the forthcoming meet- in the Egyptian Hall. The Lord Mayor presided.

The following resolutions were put and carried :—

Proposed by Sir T. WILSON, and seconded by Mr. HUNT (Hunt and Roskell) :—"That, in order to promote a full representation in the International Exhibition of the present state of the numerous metropolitan industries, which are detailed in the lists published by her Majesty's Commissioners; to allot space among metropolitan exhibitors; and generally to advise her Majesty's Commissioners; it is expedient that intending exhibitors should form (or group) themselves into Trade Committees for each of the classes and sub-classes of the Exhibition not already assigned to any national committee."

Proposed by Mr. P. GRAHAM, and seconded by Mr. THORNTHWAITE :—"That, to facilitate business, each trade committee elect a sub-committee of management, to consist of three persons."

Proposed by Mr. CRACE, and seconded by Mr. HUBERT :—"That the Right Hon. the Lord Mayor be requested to allow a general meeting of the Exhibitors to be held in the Mansion-house, when convenient to his lordship; and that the Society of Arts be requested to allow the use of its great room in the Adelphi for the meeting of the Trade Committees and sub-committees."

CONVERSAZIONE.

The Second Conversazione of this Session will take place to-morrow (Saturday) evening, at the South Kensington Museum.

In addition to the Museum, under the charge

of the Department of Science and Art, the Vernon and Turner Galleries of Paintings, and the Collection of Models belonging to the Commissioners of Patents, will be thrown open, by permission of the Trustees of the National Gallery and the Patent Commissioners.

The Bands of the Royal Horse Guards (Blue) and of the 1st Middlesex Engineer Volunteers, will be in attendance.

The doors will be opened at 8 o'clock.

TENTH ANNUAL CONFERENCE.—NOTICE TO INSTITUTIONS.

The Tenth Annual Conference between the Representatives of the Institutions in Union and the Council will be held on Tuesday, the 18th of June, at half-past 10 o'clock in the morning. Sir Thomas Phillips, Chairman of the Council, will preside.

Secretaries of Institutions in Union are requested to forward, as soon as possible, to the Secretary of the Society of Arts, the names of the Representatives appointed to attend the Conference, stating at the same time (if possible) whether those gentlemen will also be present at the Society's Annual Dinner, which will take place on the following day, and of which particulars are given below.

The Chairmen of, or Representatives from, the several Local Boards of Examiners are invited to attend.

ANNUAL DINNER.

The One Hundred and Seventh Anniversary Dinner of the Society will take place at the Crystal Palace, Sydenham, on Wednesday, the 19th June, at 5 o'clock, punctually. The Right Hon. the Earl of Elgin and Kincardine, K.T., G.C.B., will preside.

The Members and their friends will assemble in the ante-room of the Dining Hall, in the Railway-wing, at half-past four o'clock. Application for Tickets (price 10s. 6d. each) should be made to Mr. Samuel Thomas Davenport, at the Society's House. It is particularly requested that those who intend to be present will take their tickets as soon as possible in order to facilitate the arrangements.

EXAMINATIONS, 1861.

PRIZES AND CERTIFICATES AWARDED TO CANDIDATES.*

PRIZES.

Arithmetic	1st Prize	£5	To No.	447—George Noble Withall, aged 18, Sussex Hall Evening Classes—Clerk
	2nd Prize	3	"	806—George Crowther, aged 19, Messrs. Chance's Library, Birmingham—Clerk
Book-keeping	1st Prize	5	"	444—Thomas Smith, aged 18, Sussex Hall Evening Classes—Clerk
	2nd Prize	3	"	817—Allan Fulton Jack, aged 19, Messrs. Chance's, Library, Birmingham—Clerk
Algebra	1st Prize	5	"	186—Thomas Myers, aged 22, Leeds Young Men's Christian Institute—Clerk
	2nd Prize	3	"	642—George Goyne, aged 26, Leeds Mechanics' Institution—Teacher
Geometry	1st Prize	5	"	450—William Vaughan, aged 20, Sussex Hall Evening Classes—Clerk
				No Second Prize Awarded.†
Mensuration	1st Prize	5	"	193—Thomas Hick, aged 20, Leeds Young Men's Christian Institute—Teacher
				No Second Prize Awarded.†
Trigonometry	1st Prize	5	"	35—Hugh Battle, aged 40, London Mechanics' Institution—Missionary
	2nd Prize	3	"	193—Thomas Hick, aged 20, Leeds Young Men's Christian Institute—Teacher
Conic Sections	1st Prize	5	"	193—Thomas Hick, aged 20, Leeds Young Men's Christian Institute—Teacher
				No Second Prize Awarded.†
Navigation & Nautical Astronomy	1st Prize	5	"	661—Joseph William Mills, aged 18, Watt Institute, Portsea
	2nd Prize	3	"	660—Samuel James Woodman, aged 18, Watt Institute, Portsea—Engineer's Apprentice
Principles of Mechanics	...	...		*No Prizes Awarded.*‡
Practical Mechanics	...	...		*No Prizes Awarded.*‡
Magnetism, Electricity, and Heat	1st Prize	5	"	354—John Crum, aged 29, Glasgow Mechanics' Institution—Pay Clerk
	2nd Prize	3	"	360—William Hennedy, aged 23, Glasgow Mechanics' Institution—Manufacturer
Astronomy	...	...		*No Prizes Awarded.*‡

* The Prizes awarded to the Institutions and Local Boards will be announced in a future number.
† The Candidate standing second in this subject did not obtain a First-class Certificate.
‡ No Candidate obtained a First class Certificate in this subject.

Chemistry ...	1st Prize ...	5	,,	703—John Steele, aged 23, Clerkenwell Working Men's Institute—Inland Revenue Officer
	2nd Prize...	3	,,	573—William Brodie, jun., aged 18, Glasgow Mechanics' Institution—Colour Maker
Animal Physiology in relation to health	1st Prize ...	5	,,	424—Frederick William Rudler, aged 20, Royal Polytechnic Institution—Solicitor's Clerk
	2nd Prize...	3	,,	632—Thomas Denny, aged 21, Leeds Mechanics' Institution—Book-keeper
Botany.........	1st Prize ...	5	,,	144—William Wren, aged 40, Carshalton Mutual Improvement Society—Gardener
				*No Second Prize Awarded.**
Agriculture...	...	...		*No Prizes Awarded.*†
Mining and Metallurgy..	1st Prize ...	5	,,	569—Thomas Gibb, aged 21, Glasgow Mechanics' Institution—Surveyor
	2nd Prize...	3	,,	460—James Anderson, aged 20, Popular Evening Classes, Andersonian Institution, Glasgow—Studying Colliery Management
Political and Social Economy.........	...	...		*No Prizes Awarded.*†
Domestic Economy.........	...	...		*No Prizes Awarded.*‡
Geography ...	1st Prize ...	5	,,	565—Robert Clark, aged 23, Glasgow Athenæum—Clerk
	2nd Prize.§	3		
English History	1st Prize ...	5	,,	383—Richard Nicholls Worth, aged 23, Devonport Mechanics' Institute—Reporter
	2nd Prize...	3	,,	18—Joseph Harrison, aged 19, Bradford Mechanics' Institute—Woolsorter
English Literature	1st Prize ...	5	,,	383—Richard Nicholls Worth, aged 23, Devonport Mechanics' Institute—Reporter
	2nd Prize...	3	,,	539—Andrew Young, aged 18, Glasgow Athenæum—Clerk
Logic & Mental Science...	1st Prize ...	5	,,	567—John Allan, aged 22, Glasgow Athenæum—Clerk
				No Second Prize Awarded.‖
Latin and Roman History.	1st Prize ...	5	,,	828—William Craig, aged 19, Glasgow Institution—Assistant Teacher
	2nd Prize...	3	,,	814—Frederic Reeves, aged 20, Messrs. Chance's Library, Birmingham—Glass-cutter
French.........	1st Prize ...	5	,,	36—George Legg, aged 20, London Mechanics' Institution—Butcher
	2nd Prize...	3	,,	845—John Stewart, aged 23, Glasgow Institution—Clerk
German	1st Prize ...	5	,,	452—George Warington, aged 20, Sussex Hall Evening Classes—Assistant Chemist
	2nd Prize...	3	,,	454—Joseph Harvey, aged 25, Sussex Hall Evening Classes—Assistant to a Stationer
Free-hand Drawing ...	...	...		*No Prizes Awarded.*†
Mechanical Drawing ...	...	...		*No Prizes Awarded.*†
Music	1st Prize ...	5	,,	328—James Wade, aged 23, Glasgow Mechanics' Institution—Architect
	2nd Prize...	3	,,	677—Davenport William Cartwright, aged 23, Nottingham Mechanics' Institution—Warehouseman

* The Candidate standing second in this subject did not obtain a First-class Certificate.
† No Candidate obtained a First class Certificate in this subject.
‡ The only Candidate who obtained a First-class Certificate in this subject is disqualified for a Prize.
§ The award of the 2nd Prize in this subject is at present not decided.
‖ The only other Candidate who obtained a First-class Certificate in this subject is disqualified for a Prize.

CERTIFICATES.

The following is an Alphabetical List of the Candidates who have obtained Certificates:—

(1st)	after a subject signifies a	First-class	Certificate.
(2nd)	,, ,,	Second-class	,,
(3rd)	,, ,,	Third-class	,,

(The occupations stated are either present or proposed.)

No.
594—Abercromby, Andrew, aged 17, Aberdeen M.I., Clerk—Arithmetic (3rd)
482—Adam, James, Jun., aged 18, Popular Evening Classes, Andersonian Inst., Glasgow, Clerk—Chemistry (2nd)
294—Alexander, William, aged 19, Paisley Artisans' Inst., Wright—Music (3rd)
493—Allan, James, aged 17, Andersonian Inst., Glasgow, Clerk—Chemistry (3rd)
567—Allan, John, aged 22, Glasgow Athenæum, Clerk—English Literature (2nd); Logic (1st) with 1st Prize
345—Allan, Robert Miller, aged 20, Glasgow M.I., Clerk—Book-keeping (1st)
435—Allen, William, aged 28, Sussex Hall Evening Classes, Clerk—English History (1st)
516—Allport, James, aged 18, Derby Working Men's Association, Pupil Teacher—Arithmetic (2nd); Algebra (2nd); Freehand Drawing (2nd)
301—Anderson, James, aged 39, People's College, Sheffield, Boot-maker—Geography (1st)
364—Anderson, James, aged 23, Glasgow M.I., Clerk—Arithmetic (1st); Book-keeping (1st); Algebra (1st)
460—Anderson, James, aged 20, Popular Evening Classes, Andersonian Inst., Glasgow, studying Colliery Management—Mining and Metallurgy (1st) with 2nd Prize
508—Appleyard, Joseph Thomas, aged 18, Railway Lit. Inst., Derby, Pupil Teacher—Arithmetic (1st); Algebra (2nd); Geography (1st)

78—Armitage, Joseph, Jun., aged 22, Leeds Young Men's Christian Inst., Superintendent Clerk—Book-keeping (1st)
46—Aumonier, Frederic, aged 23, London M.I., Salesman at Paper-stainers'—Book-keeping (1st)
29—Aves, Samuel, aged 20, Hertford Lit. and Sci. Inst., Clerk—Arithmetic (1st)
122—Badger, William, aged 20, Rotherham Young Men's Christian Institute, Engineer—Practical Mechanics (3rd)
320—Bagshawe, Washington, aged 17, People's College, Sheffield, Clerk—French (3rd)
804—Bailey, David, aged 26, Bilston Inst., Schoolmaster—Algebra (2nd)
598—Baker, Gerald Thomas, aged 18, Aberdeen M.I., Clerk—French (3rd)
402—Baker, William Henry, aged 17, St. Stephen's Inst., Westminster, Pupil Teacher—Arithmetic (1st); Algebra (3rd)
699—Balme, Henry, aged 21, Halifax W. M. College, Woolsorter—Arithmetic (3rd)
634—Bannister, William, aged 22, Leeds Church Institute, Letter Carrier—English History (2nd)
357—Barclay, David, aged 16, Glasgow M.I., Architect's Apprentice—Freehand Drawing (3rd)
851—Barclay, John William, aged 24, Glasgow Inst., Book-keeper—Arithmetic (2nd)
722—Barker, Mark, aged 21, Halifax, M.I., Card Printer—Arithmetic (3rd)
134—Barker, William Jas., aged 17, Wigan M.I., Attorney's Clerk—Geography (1st)
126—Barnish, William Croudson, aged 21, Wigan M.I., Chemist and Druggist—Magnetism, Electricity, and Heat (3rd)
350—Barr, William, aged 16, Glasgow M.I., Clerk—Arithmetic (2nd)
505—Barrett, Edwin, aged 24, Ipswich M.I., Bookseller—English Literature (3rd)
255—Barry, Thomas, aged 17, Manchester M.I., Warehouseman—Arithmetic (3rd)
254—Bates, Arthur, aged 23, Manchester M.I., Clerk—German (2nd)
35—Battle, Hugh, aged 40, London M.I., Missionary—Trigonometry (1st) with 1st Prize
179—Bedford, Charles, aged 18, Leeds Young Men's Christian Institute, Mechanic—Geometry (2nd); Algebra (2nd)
160—Beesley, William, aged 17, Banbury, M.I., Clerk—Book-keeping (2nd)
135—Bell, Thomas Alfred, aged 17, Wigan M.I., Clerk—Arithmetic (1st); Algebra (3rd)
453—Benson, George, aged 21, Sussex Hall Evening Classes, Telegraph Clerk—English History (2nd)
61—Bensted, William Allan, aged 16, Richmond Parochial Library, Clerk—Geography (3rd)
68—Bentley, Michael John, aged 16, Selby M.I., Chemist and Druggist—Arithmetic (2nd)
396—Berry, William, aged 21, Henshaw-street Mutual Improvement Society, Oldham, Warehouseman—Book-keeping (3rd)
85—Bevan, John James, aged 20, Farnham Young Men's Inst., Grocer—Arithmetic (1st)
322—Biggin, Isaac, aged 23, People's College, Sheffield, File warehouseman—Arithmetic (3rd)
256—Binney, Frederick Altona, aged 16, Manchester M.I., Clerk—Algebra (3rd); Geometry (3rd)
341—Binnie, John, aged 22, Glasgow M.I., Warehouseman—Arithmetic (1st)
542—Binny, Alexander, aged 26, Glasgow Athenæum, Clerk—English Literature (1st)
499—Bird, Frederick, aged 21, Ipswich M.I., Auctioneer's Clerk—Book-keeping (1st)
716—Birtwhistle, Joseph Priestley, aged 21, Halifax M.I., Bookbinder—Book-keeping (2nd)
368—Black, William, aged 19, Glasgow M.I., Clerk—Botany (2nd)
257—Blagg, William Thomas, aged 18, Manchester M.I., Lithographic Printer—Book-keeping (3rd)
258—Blair, William, aged 17, Manchester M.I., Grocer's Apprentice—Book-keeping (2nd)
190—Blakey, John, aged 17, Leeds Young Men's Christian Inst., Clerk—Arithmetic (2nd)
694—Bland, John, aged 18, Halifax W. M. Coll., Dyer—Chemistry (1st)
259—Blomeley, Robert, aged 23, Manchester M.I., Clerk—Book-keeping (2nd)
758—Blunden, Henry James, aged 16, Dudley Educational Inst., Pupil Teacher and Organist—Music (1st)
395—Boardman, Thomas, aged 23, Henshaw-street Mutual Improvement Society, Oldham, Piecer—Book-keeping (2nd)
8—Boddy, James, aged 23, Bradford M.I., Clerk—Arithmetic (3rd); Mensuration (3rd)
773—Boden, George, aged 20, Stourbridge M.I., Reporter—English Literature (2nd); French (2nd)
53—Bolingbroke, Marshall, aged 20, Newcastle-on-Tyne Church of England Inst.—Arithmetic (2nd); Algebra (3rd); Music (2nd)
376—Bone, William John, aged 17, Devonport M.I., Shipwright Apprentice—Arithmetic (2nd); Algebra (2nd); Mensuration (2nd)
739—Bonny, Charles, aged 24, Brompton Church of England Young Men's Institute, Ropemaker—Arithmetic (1st); Algebra (3rd)
719—Boocock, William Henry, aged 23, Halifax M.I., Solicitor's Clerk—Arithmetic (3rd); Book-keeping (2nd)
802—Booth, Henry Clinton, aged 17, Bilston Inst., Pupil Teacher—Geography (3rd)
17—Bottomley, Robert, aged 17, Bradford M.I., Warehouseman—Algebra (2nd)
202—Bradbury, John Batley, aged 16, Leeds Young Men's Christian Institute, Pupil Teacher—English History (1st); Geography (1st)
720—Braithwaite, James William, aged 19, Halifax M.I., Carver and Gilder—English Literature (2nd)
310—Bramhall, John, aged 22, People's College, Sheffield, Usher—Arithmetic (2nd)
304—Bramwell, John Henry, aged 19, People's College, Sheffield, File Cutter—French (3rd)
840—Brand, Andrew, aged 16, Glasgow Inst., Accountant's Clerk—French (2nd)
689—Brear, William, aged 17, Halifax W. M. College, Warehouseman—Arithmetic (1st); Book-keeping (2nd)
844—Bremner, Henry, aged 19, Glasgow Inst., Commercial Clerk—Latin and Roman History (1st)
57—Brewis, John, aged 22, Newcastle-on-Tyne M.I., Grocer and Tallow Chandler—Book-keeping (3rd)
636—Broadbent, James, aged 19, Leeds M.I., Warehouseman—Arithmetic (3rd); Book-keeping (1st)
573—Brodie, William, junr., aged 18, Glasgow M.I., Colour Maker—Chemistry (1st) with 2nd Prize
261—Brooke, Henry, aged 20, Manchester M.I., Merchant's Assistant—Book-keeping (2nd)
547—Brosnahan, William, aged 22, Glasgow Athenæum, Inland Revenue Officer—English History (2nd); English Literature (2nd); Logic and Mental Science (2nd)
302—Brown, Enos, aged 20, People's College, Sheffield, Engraver—Arithmetic (2nd)
668—Brown, James, aged 29, Salford W. M. College, Clerk—Chemistry (1st)
764—Brown, James, aged 20, Wolverhampton W. M. College, Clerk—Book-keeping (1st)
754—Brown, Thomas, aged 28, Dudley Educational Inst., Collecting Agent—French (2nd)
167—Broxup, James, aged 19, Burnley M.I., Mechanic—Arithmetic (3rd); Practical Mechanics (2nd)
829—Bulley, Wemyss Orrok, aged 19, Glasgow Inst., Clerk—French (1st)
602—Bulloch, William, aged 19, Aberdeen M.I., Clerk—French (3rd)

726—Bunce, John Friend, aged 27, Canterbury Church of England Young Men's L.I., Turner—Arithmetic (1st); French (2nd)
811—Burden, William Henry, aged 17, Messrs. Chance's Library, Birmingham, Clerk—Arithmetic (1st); Book-keeping (2nd)
393—Burdett, Thomas, aged 19, Bury Athenæum, Factory Operative—Arithmetic (3rd)
206—Burgess, Martha, aged 36, Macclesfield Useful Knowledge Society, Housekeeper—Domestic Economy (2nd); French (3rd)
759—Butler, James Henry, aged 19, W. M. Coll., Wolverhampton, Presser and Stamper—Book-keeping (1st); Algebra (1st)
67—Butterworth, Joseph, aged 17, Selby M.I., Wheelwright—Book-keeping (3rd)
761—Caddick, James, aged 23, Wolverhampton W. M. Coll. Clerk—Arithmetic (1st); Book-keeping (1st); French (3rd)
262—Cadley, George, aged 18, Manchester M.I., Boot Closer—Book-keeping (2nd)
23—Cameron, John, jun., aged 22, Carlisle Church of England Inst., Clerk—Algebra (3rd)
646—Cane, Charles, aged 18, Leeds M.I., Art Student—Free-hand Drawing (2nd)
433—Cannon, James, aged 21, Sussex-hall Evening Classes, Clerk to Ship and Insurance Broker—Book-keeping (2nd); Latin and Roman History (3rd)
375—Canter, William James, aged 16, Devonport M.I., Engineer's Apprentice—Arithmetic (2nd); Algebra (2nd); Mensuration (2nd)
237—Carling, William, aged 28, Hitchin M.I., Miller—Practical Mechanics (2nd)
462—Carswell, John, aged 22, Popular Evening Classes, Andersonian Inst., Glasgow, Miner—Mining and Metallurgy (2nd)
730—Carter, Charles Stanhope, aged 17, Barnet, Civil Service—Arithmetic (3rd)
677—Cartwright, Davenport William, aged 23, Nottingham M.I., Warehouseman—Music (1st) with 2nd Prize
317—Cartwright, William Rodgers, aged 19, People's College, Sheffield, Attorney's Clerk—Book-keeping (2nd)
509—Cay, George, aged 23, Derby Working Men's Association, Brush-maker—Book-keeping (2nd); Geography (2nd)
591—Chalmers, Jonathan, aged 20, Aberdeen M.I., Woollen Warehouseman—English History (2nd)
706—Chapman, James, aged 36, Birmingham and Midland I., Telegraph Clerk—Algebra (2nd); Chemistry (2nd)
58—Charlton, James, aged 21, Newcastle-on-Tyne M.I., Poor-Law Union Assistant-Clerk—Arithmetic (2nd); Book-keeping (3rd); Algebra (2nd)
528—Chatterton, Thomas, aged 20, Louth M.I., Merchant's Clerk—Geography (2nd)
735—Chedzoy, Charles William, aged 17, Barnet Inst.—Book-keeping (2nd)
263—Chester, Martin, aged 19, Manchester M.I., Clerk—French (1st)
621—Child, Wallace, aged 19, Leeds M.I., Exciseman—Arithmetic (3rd); Algebra (3rd); Geometry (3rd); Music (2nd);
293—Christie, David, aged 19, Paisley Artisans' Inst., Drawer—Music (3rd)
565—Clark, Robert, aged 23, Glasgow Athenæum, Clerk—Geography (1st) with 1st Prize
442—Clark, Walter Robert, aged 21, Sussex Hall Evening Classes, Clerk—Arithmetic (2nd)
866—Clayton, John Rodbert, aged 16, Carlisle Young Mens' Christian I., Grocers' Apprentice—Arithmetic (1st)
473—Cleland, Mathew, aged 19, Andersonian Inst., Glasgow, Miner—Mining (only) (3rd)
181—Cliff, James, aged 18, Leeds Young Men's Christian Inst., Warehouseman, Geography (2nd)
157—Collett, John, aged 25, Banbury M.I., Clerk—Arithmetic (2nd); Algebra (3rd)
340—Colquhoun, Alexander, aged 17, Glasgow M.I., Clerk—Arithmetic (2nd)
834—Colquhoun, James, aged 16, Glasgow I., Clerk—Latin and Roman History (2nd)
104—Cook, Edmund, aged 19, Bristol Athenæum, Assistant in Warehouse—English Literature (2nd)
384—Cook, George John, aged 18, Devonport M.I., Shipwright's Apprentice—Algebra (3rd); Mensuration (3rd)
326—Cook, Philip, aged 17, Glasgow M.I., Clerk—French (3rd)
83—Coombe, Peter Alfred, aged 28, Pershore M.I., Solicitor's Clerk—Algebra (3rd)
587—Cooper, Arthur, aged 30, Aberdeen M.I., Locomotive Fireman—Magnetism, Electricity, and Heat (2nd)
264—Cooper, Charles, aged 19, Manchester M.I., Passe-partout Maker—Book-keeping (2nd)
501—Cooper, Gilbert Palin, aged 17, Ipswich M.I., Solicitor's Clerk—Music (2nd)
563—Cowan, David, aged 20, Glasgow Athenæum, Plumber—English Literature (3rd)
21—Cowen, William, aged 18, Carlisle Church of England Inst., Clerk—Arithmetic (3rd); Book-keeping (3rd)
737—Cowles, Alfred, aged 19, St. Thomas' Charter-house Evening Classes, Clerk—Arithmetic (3rd)
407—Craig, Edward, aged 16, St. Stephen's (Westminster) Inst., Clerk—Algebra (3rd); Music (2nd)
570—Craig, John, aged 19, Glasgow M.I., Clerk—Book-keeping (1st); Geometry (3rd)
855—Craig, Margaret, aged 24, Glasgow Inst., Assistant Teacher—French (3rd)
828—Craig, William, aged 19, Glasgow Inst., Assistant Teacher—Latin and Roman History (1st) with 1st Prize
5—Craven, William, aged 19, Bradford M.I., Warehouseman—English History (3rd)
426—Crombie, George, aged 18, York Institute, Solicitor's Clerk—English History (1st)
152—Crosker, William, aged 23, Leicester Church of England I., Hosier—Music (2nd)
876—Cross, Thomas, aged 21, St. Stephen's (Westminster) Inst., Schoolmaster—Music (1st)
27—Crouch, Charles, aged 19, Hertford Lit. and Scien. I., Merchant's Clerk—Arithmetic (3rd)
30—Crouch, John, jun., aged 20, Hertford Lit. and Scien. I., Attorney's Clerk—Algebra (2nd)
806—Crowther, George, aged 19, Messrs. Chance's Library, Birmingham, Clerk—Arithmetic (1st) with 2nd Prize; Book-keeping (1st)
354—Crum, John, aged 29, Glasgow M.I., Pay Clerk—Magnetism, Electricity, and Heat (1st) with 1st Prize.
461—Cunningham, Archibald, aged 23, Popular Evening Classes, Andersonian Inst., Glasgow, Miner—Mining (only) (3rd)
489—Currie, David, jun., aged 21, Popular Evening Classes, Andersonian Inst., Glasgow, Mercantile Clerk—Magnetism, Electricity, and Heat, (3rd)
553—Cuthill, William, aged 21, Glasgow Athenæum, Mechanical Engineer—Practical Mechanics (2nd); Geography (2nd)
641—Dalby, Edward, aged 18, Leeds M.I., Mechanic—Arithmetic (2nd); Practical Mechanics (2nd)
477—Dale, William, aged 19, Popular Evening Classes, Andersonian Inst., Glasgow—Algebra (2nd)
93—Dalton, Edward, aged 19, Cranbourne M.I., Clerk—Arithmetic (3rd)
707—Dance, Joseph Henry, aged 26, Birmingham and Midland I., Brass Turner—Arithmetic (2nd); Algebra (1st)

874—Darby, Thomas Charles, aged 19, Chelmsford M.I., Farmer—Free-hand Drawing (2nd)
766—Davenport, James, aged 21, Wolverhampton W. M. College, Grocer—Arithmetic (2nd)
244—Davidson, John, aged 18, Liverpool I., Clerk—Arithmetic (3rd)
113—Dean, George Henry, aged 20, Greenwich, Teacher—Arithmetic (2nd)
306—Deans, Joseph, aged 17, People's College, Sheffield, Whipmaker—Arithmetic (2nd)
721—Denham, David, aged 19, Halifax M.I., Clerk—French (2nd)
632—Denny, Thomas, aged 21, Leeds M.I., Book-keeper—Animal Physiology (1st) with 2nd Prize
717—Dewhirst, William Thomas, aged 19, Halifax M.I., Clerk—English Literature (1st)
19—Dibb, Charles Henry, aged 17, Bradford M.I., Woolsorter—Arithmetic (3rd); Algebra (3rd); Geography (2nd)
347—Dickson, James, aged 22, Glasgow M.I., Clerk—Algebra (1st); Principles of Mechanics (3rd)
524—Dippy, Thomas, aged 19, Pembroke Dock M.I., Shipwright Apprentice—Algebra (2nd); Mensuration (2nd); Trigonometry (3rd)
56—Dodd, John, aged 20, Newcastle-on-Tyne M.I., Clerk—Arithmetic (3rd); Algebra (3rd)
298—Dodworth, George Thompson, aged 18, People's College, Sheffield—Tableblade Forger—Arithmetic (3rd)
156—Donelly, Thomas, aged 20, Banbury M.I., Builder's Clerk—Arithmetic (2nd); Book-keeping (2nd)
507—Dothie, Gordon, aged 22, Ipswich M.I., Tobacconist—English History (2nd); English Literature (3rd)
265—Douglas, Peter, aged 16, Manchester M.I., Counting-house Assistant—Arithmetic (3rd)
589—Dow, James, aged 21, Aberdeen M.I., Engineer—English Literature (2nd)
45—Driscoll, John, aged 24, London M.I., Dentist—Animal Physiology (2nd)
506—Drummond, Edgar Henry, aged 16, Ipswich M.I.,—Arithmetic (3rd); German (3rd); Latin and Roman History (2nd)
305—Dufty, Joseph, aged 18, People's College, Sheffield, Confectioner—Arithmetic (3rd); French (2nd)
370—Dunn, William, aged 18, Glasgow M.I., Salesman—Book-keeping (3rd)
698—Dyson, John Henry, aged 19, Halifax W. M. Coll., Clerk—Geography (3rd)
669—Dyson, Walter, aged 20, Salford W. M. Coll., Chemist and Druggist—Chemistry (1st)
422—Eastman, William, aged 16, Royal Polytechnic Inst. Classes, Dyer—Latin and Roman History (3rd)
59—Emmens, Stephen Henry, aged 17, Newcastle-on-Tyne M.I., Civil Engineer—Principles of Mechanics (3rd); Practical Mechanics (3rd)
847—Emtage, Henry Carrington, aged 26, Glasgow Inst., Civil Engineer—Mensuration (3rd); Practical Mechanics (2nd)
808—England, George, aged 18, Messrs. Chance's Library, Birmingham, Chemist's Apprentice—Chemistry (3rd)
423—Evans, George, aged 22, Royal Polytechnic Inst. Classes, Butcher—Arithmetic (3rd)
440—Evans, James, aged 21, Sussex-hall Evening Classes, Clerk—Book-keeping (2nd)
809—Evans, Thomas, aged 16, Messrs. Chance's Library, Birmingham, Clerk—Arithmetic (3rd); Book-keeping (3rd)
464—Fairlie, Henry, aged 17, Popular Evening Classes, Andersonian Inst., Glasgow, Clerk—Arithmetic (3rd); Chemistry (1st)
362—Farm, Andrew, aged 30, Glasgow M.I., Pattern Drawer—Freehand Drawing (3rd)
110—Farncomb, Edward, aged 33, Greenwich M.I., Teacher (Private School)—Freehand Drawing (2nd)
878—Finlayson, Alexander, aged 19, Aberdeen M.I., Writer—English History (3rd)
142—Finn, Edward Cornelius, aged 20, Ashford S. E. Railway M.I., Railway Clerk—Arithmetic (1st); Book-keeping (1st)
438—Fisher, Benjamin, aged 18, Sussex-hall Evening Classes, Clerk—Book-keeping (1st)
371—Fitze, William James, aged 16, Devonport M.I., Shipwright Apprentice—Arithmetic (1st); Algebra (1st); Book-keeping (3rd)
712—Fletcher, Mary Ann, aged 30, Birmingham and Midland Inst., Governess—French (3rd)
303—Flockton, William, aged 25, People's College, Sheffield, Book-keeper—English Literature (3rd)
373—Fogwell, Alexander Frederick, aged 18, Devonport M.I., Shipwright Apprentice—Arithmetic (2nd); Algebra (2nd); Mensuration (2nd)
168—Fox, William James, aged 18, Burnley M.I., Chemist—Arithmetic (3rd)
338—Frame, Alexander, aged 22, Glasgow M.I., Commercial Clerk—French (2nd)
605—Fraser, John, aged 23, Aberdeen M.I., Bookbinder—Mechanical Drawing (3rd); Free-hand Drawing (3rd)
803—Frederick, Leonard, aged 18, Bilston Inst., Watchmaker—Arithmetic (3rd)
624—Freeman, James, aged 23, Leeds M.I., Mason—Arithmetic (3rd)
705—Fulford, Elizabeth, aged 17, Birmingham and Midland Inst., English History (2nd)
768—Fuller, William Moxon, aged 30, Wolverhampton Young Men's Christian Institute, Manager of Works—Animal Physiology (3rd)
195—Furbank, Robert Archer, aged 16, Leeds Young Men's Ch. I., Clerk—Arithmetic (1st); Algebra (2nd)
394—Furness, John Thomas, aged 21, Bury Athenæum, Hatter—Arithmetic (1st)
616—Gaines, John William, aged 19, Leeds Mechanics' Institute, Clerk—Book-keeping (1st)
562—Galbraith, James Stevenson, aged 19, Glasgow Tonic Sol-Fa Institute, Clerk—Music (3rd)
344—Galloway, John, aged 20, Glasgow M.I., Mercantile Clerk—Book-keeping (2nd)
557—Gardner, Robert, aged 19, Glasgow Athenæum, Ironmonger—English Literature (2nd)
566—Garner, George James, aged 18, Glasgow Athenæum, Clerk—Book keeping (1st)
451—Garside, Henry James, aged 17, Sussex Hall Evening Classes, Clerk—Book-keeping (1st)
827—Gaskin, Richard, aged 16, Croydon Lit. and Sci. Inst., Ironmonger's Clerk—English History (3rd)
805—Genner, Job, aged 21, Messrs. Chance's Library, Birmingham, Clerk—Arithmetic (2nd); Book-keeping (1st)
569—Gibb, Thomas, aged 21, Glasgow M.I., Surveyor—Mining and Metallurgy (1st) with 1st prize
95—Gibbs, John, aged 38, Chelmsford L. and M.I., Wool-sorter—Arithmetic (3rd); Political and Social Economy (2nd); Geography (3rd)
291—Gibson, Andrew, aged 20, Paisley Artizans' Inst., Baker—Music (3rd)
596—Gifford, James, aged 22, Aberdeen M.I., Carver and Gilder—Free-hand Drawing (2nd)
399—Gihon, John, aged 21, Oldham Lyceum, Civil Service—Navigation and Nautical Astronomy (2nd)
842—Gilbertson, John, aged 22, Glasgow Inst., Clerk—Book-keeping (2nd)
556—Gillespie, William, aged 23, Glasgow Athenæum, Schoolmaster—Logic (1st)
183—Gledhill, David, aged 16, Leeds Young Men's Christian Inst.—Book-keeping (1st)
850—Glen, William, jun., aged 18, Glasgow Inst., Clerk—Book-keeping (2nd)
145—Godfrey, Isaac, aged 19, Leicester Church of England I., Hosier—Arithmetic (1st); Book-keeping (3rd)

410—Goode, Frederick James, aged 17, St. Stephen's Inst., Westminster, Pupil Teacher—Arithmetic (1st)
642—Goyne, George, aged 26, Leeds M.I., Teacher—Arithmetic (2nd); Algebra (1st) with 2nd prize
864—Graham, George, aged 26, Carlisle Young Men's Christian I., Grocers' Assistant—Arithmetic (3rd)
791—Gray, Thomas, aged 27, Wednesbury M.I., Clerk—French (3rd)
174—Green, John Alfred, aged 20, Leeds Young Men's Christian Inst., Timekeeper—Book-keeping (2nd)
13—Greenhough, John Gershom, aged 17, Bradford M.I., Merchant's Clerk—Algebra (2nd); Geometry (2nd); Trigonometry (3rd); English Literature (1st)
728—Greenstreet, Stephen Henry, aged 18, Canterbury Church of England Young Men's L.I., Pupil Teacher—Arithmetic (3rd); Geography (2nd)
268—Gresty, Jonathan, aged 24, Manchester M.I., Salesman—Arithmetic (2nd); Book-keeping (2nd)
387—Grieveson, John, aged 28, Darlington Church of England Inst., Railway Agent—Geography (1st)
523—Griffiths, Henry, aged 19, Pembroke Dock M.I., Shipwright—Arithmetic (3rd)
99—Griffiths, Henry Garman, aged 16, Bristol Athenæum, Mechanical Draughtsman—Principles of Mechanics (3rd); Chemistry (3rd)
247—Griffiths, John, aged 20, Liverpool Inst., Letter Carrier—Arithmetic (3rd)
740—Griffiths, John Joseph, aged 22, Brompton Ch. of Eng. Young Men's Inst., Caulker—Arithmetic (2nd)
772—Griffiths, William, aged 21, Stourbridge W. M. Inst., School-teacher—Arithmetic (3rd); Book-keeping (2nd); Algebra (3rd)
873—Grigsby, David Day, aged 16, Chelmsford M.I., Solicitor's Clerk—Free-hand Drawing (3rd)
388—Ground, William David, aged 19, Darlington Church of England Inst., Solicitor's Clerk—Arithmetic (3rd); Book-keeping (2nd)
534—Haggan, Charles Henry, aged 18, People's Reading Rooms, Belfast, Engineer—Arithmetic (3rd)
269—Hague, Thomas Scholes, aged 22, Manchester M.I., Warehouseman—French (3rd)
32—Haigh, James, aged 18, Holmfirth M.I., Boot and Shoemaker—Arithmetic (3rd); Mensuration (3rd)
84—Haines, George, aged 16, Aldershot Inst., Clerk—Arithmetic (1st); Book-keeping (2nd)
770—Hallam, John, aged 28, Wolverhampton Young Men's Christian Inst., Clerk in Iron Works—Arithmetic (1st)
701—Halliday, John, aged 18, Halifax W. M. Coll., Weaver—Arithmetic (3rd)
297—Hammill, James, aged 20, People's College, Sheffield, Lithographer—Algebra (3rd)
870—Hammond, John, aged 17, Sir Walter St. John's Evening School, Battersea, Glover—Arithmetic (3rd)
151—Hancock, John Henry, aged 20, Leicester Church of England I., Warehouseman—Arithmetic (3rd)
296—Hannah, William, aged 19, Paisley Artizan's Inst., Clerk—Arithmetic (3rd)
137—Hardcastle, John William, aged 16, York Inst., Clerk—Arithmetic (1st)
437—Harding, James Staughton, aged 21, Sussex Hall Evening Classes, Clerk—French (2nd)
789—Hardy, William Henry, aged 21, Wednesbury M.I., Clerk—Arithmetic (3rd)
65—Harper, Thomas Hammond, aged 19, Selby M.I., Grocer and Draper—Mensuration (3rd)
765—Harrington, Walter, aged 17, Wolverhampton W. M. Coll., Clerk—Arithmetic (3rd)
114—Harrison, Benjamin Laxton, aged 18, Peterborough M.I., Engine Fitter and Turner—Arithmetic (2nd); Geometry (3rd); Algebra (3rd)
389—Harrison, John, jun., aged 17, Darlington Church of England Inst., Land Agent—Arithmetic (3rd)
18—Harrison, Joseph, aged 19, Bradford M.I., Woolsorter—English History (1st) with 2nd Prize; Astronomy (2nd); Latin and Roman History (3rd)
270—Hartley, Joseph, aged 20, Manchester M.I., Blowing-room Overlooker—Chemistry (3rd)
678—Harvey, James Watson, aged 18, Nottingham M.I., Warehouseman—English History (2nd)
454—Harvey, Joseph, aged 25, Sussex Hall Evening Classes. Stationer's Assistant—German (1st) with 2nd Prize.
679—Harvey, Thomas, aged 16, Nottingham M.I., Warehouseman—Geography (3rd)
225—Haworth, William Henry, aged 16, Blackburn M.I., Power-loom Weaver—Arithmetic (3rd)
1—Hayward, Thomas, aged 20, Bradford M.I., Clerk—English Literature (2nd)
166—Healey, Thomas, aged 21, Burnley M.I., Book-keeper—English History (2nd); Mensuration (3rd); Music (3rd)
162—Helm, Elisha Ward, aged 16, Padiham M.I., Scholar—English History (3rd)
488—Henderson, John, aged 34, Popular Evening Classes, Andersonian Inst., Glasgow, Letter-press Printer—Magnetism, Electricity, and Heat (2nd)
361—Hennedy, David, aged 21, Glasgow M.I., Warehouseman—Music (2nd)
360—Hennedy, William, aged 23, Glasgow M.I., Manufacturer—Magnetism, Electricity, and Heat (1st) with 2nd Prize
425—Henshaw, Thomas Pigot, aged 18, Royal Polytechnic Inst. Classes—Magnetism, Electricity, and Heat (2nd)
333—Herriot, John, aged 21, Glasgow M.I., Clerk—Book-keeping (1st)
193—Hick, Thomas, aged 20, Leeds Young Men's Christian Inst., Teacher—Conic Sections (1st) with 1st Prize; Mensuration (1st) with 1st Prize; Trigonometry (1st) with 2nd Prize
680—Higgs, Frederick Seagrave, aged 17, Nottingham M.I., Chemist and Druggist—Chemistry (3rd)
309—Hill, Charles, aged 22, People's College, Sheffield, Engraver's Tool Maker—French (3rd)
31—Hills, Henry George, aged 18, Hertford L. and S. I., Printer—Algebra (1st); Geography (1st)
741—Hoare, Henry, aged 19, Brompton Church of England Young Men's Inst., Shipwright's Apprentice—Arithmetic (3rd); Algebra (3rd)
161—Hobley, Frederic, aged 16, Banbury M.I., Clerk—Arithmetic (1st); Algebra (2nd)
780—Hodgetts, Charles Blakemore, aged 26, Cradley Night School, Book-keeper—Chemistry (2nd)
681—Hodgson, Thomas, aged 20, Nottingham M.I., Clerk—Arithmetic (1st)
184—Holey, George Thomas, aged 21, Leeds Young Men's Christian Inst., Clerk—Book-keeping (1st)
757—Holland, Benjamin, aged 22, Dudley Educational Inst., Builder—Arithmetic (3rd)
525—Holliday, Thomas, aged 22, Carlisle M.I., Shopman—Arithmetic (3rd)
812—Holloway, Isaac, aged 21, Messrs. Chance's Library, Birmingham, Glass Painter—Freehand Drawing (2nd)
5[illegible]0—Holloway, William, aged 36, London M.I., Schoolmaster—Geography (1st)
420—Holloway, William Henry, aged 16, Royal Polytechnic Inst. Classes, Clerk—Arithmetic (3rd)
537—Holmes, Robert Anderson, aged 18, Glasgow Athenæum, Clerk—English Literature (2nd)
857—Holmes, Peter, aged 17, Manchester M.I., Clerk—Book-keeping (1st)
103—Home, Charles George, aged 17, Bristol Athenæum, Post office Clerk—Geography (3rd)
408—Hopkins, Thomas, aged 35, St. Stephen's (Westminster) Evening School, Teacher—Music (1st)
625—Horner, Thomas, aged 28, Leeds M.I., Warehouseman—Arithmetic (3rd)

807—Horton, Joseph, aged 21, Messrs. Chance's Library, Birmingham, Clerk—Arithmetic (3rd)
445—Hoskins, Henry, aged 23, Sussex-hall Evening Classes, Clerk—Algebra (1st)
617—Howgate, Joseph, aged 17, Leeds Church Inst., Pupil Teacher—Arithmetic (2nd); Geography (3rd)
529—Hubbard, Elizabeth, aged 18, Louth M.I., Governess—Music (3rd)
727—Hudson, Zechariah, aged 17, Canterbury Church of England Young Men's L.I., Solicitor's Clerk—English History (3rd)
366—Hunter, John, aged 24, Glasgow M.I., Book-keeper—Book-keeping (1st)
583—Hunter, Joseph, aged 20, Aberdeen M.I., Land Surveyor—Geometry (3rd)
116—Hurst, John, aged 16, Rotherham Young Men's Christian I., Pupil Teacher—Geography (3rd)
550—Hutcheson, George, aged 16, Glasgow Athenæum, Clerk—Geography (2nd)
163—Hutchinson, Robert, aged 16, Padiham M.I., Warehouseman—Arithmetic (2nd)
336—Hyde, James Wilson, aged 20, Glasgow M.I., Post-office Clerk—Arithmetic (1st); Book-keeping (1st); Algebra (3rd); Mensuration (3rd)
367—Hyde, Robert Mettam, aged 18, Glasgow M.I., Post-office Clerk—Arithmetic (1st); Book-keeping (1st)
492—Imrie, Henry Arnott, aged 30, Andersonian Inst., Glasgow, Warehouseman—Chemistry (3rd)
682—Ingle, Frederick, aged 22, Nottingham M.I., Architect and Surveyor—Mechanical Drawing (2nd)
356—Ireland, John, aged 22, Glasgow M.I., Shopman—Music (1st)
817—Jack, Allan Fulton, aged 19, Messrs. Chance's Library, Birmingham, Clerk—Book-keeping (1st) with 2nd Prize
232—Jeeves, Alfred, aged 25, Hitchin M.I., Solicitor's Clerk—Arithmetic (3rd)
619—Jenkinson, Henry Irwin, aged 22, Leeds M.I., Clerk—Algebra (2nd); English History (1st)
518—John, William, aged 16, Pembroke Dock M.I., Shipwright—Arithmetic (1st); Algebra (1st)
520—Johns, Thomas Bowen, aged 21, Pembroke Dock M.I., Shipwright—Arithmetic (2nd); Algebra (2nd); Mensuration (2nd)
610—Johnson, Benjamin, aged 17, Fursley M.I., Weaver—Arithmetic (3rd)
708—Johnson, Charles, aged 23, Birmingham and Midland I., Telegraph Clerk—Arithmetic (2nd)
10—Johnson, Thomas, aged 23, Bradford M.I., Grocer—Book-keeping (3rd)
786—Jones, Joseph, aged 17, West Bromwich Young Men's Christian Inst., Pupil Teacher—Arithmetic (3rd)
40—Joseph, Isaac, aged 20, London M.I., Clerk—Book-keeping (1st)
862—Joy, John Henry, aged 18, Carlisle Young Men's Christian I., Pupil Teacher—Arithmetic (3rd); Music (3rd)
401—Kennedy, James, aged 17, St. Stephen's Evening School, Westminster, Clerk—Practical Mechanics (3rd)
538—Kennedy, Patrick Alphonsus, aged 18, Glasgow Tonic Sol Fa Inst., Pawnbroker—Music (3rd)
229—Kenyon, Thomas, aged 19, Blackburn M.I., Warehouseman—Mensuration (3rd)
471—Kerr, James, aged 18, Popular Evening Classes, Andersonian Institute, Glasgow, Clerk, Arithmetic (3rd); Geography (2nd)
620—Kettlewell, John, aged 20, Leeds Church Institute, Pupil Teacher—Geography (3rd)
590—Kilgour, George, aged 16, Aberdeen M.I., Draper—Arithmetic (3rd)
100—Kilkeary, John, aged 21, Bristol Athenæum, Warehouse Clerk—English Literature (2nd); French (3rd)
744—King, John Harris, aged 16, Brompton Church of England Young Men's Institute, Shipwright's Apprentice—Arithmetic (2nd)
745—King, George Henry, aged 16, Brompton Church of England Young Men's Institute, Pupil Teacher—Arithmetic (2nd)
38—Kirk, Richard Edward Gent, aged 17, London M.I., Messenger in H. M. Record Office—Latin and Roman History (1st)
626—Knapton, William, aged 32, Leeds M.I., Mason—English History (2nd)
729—Knowler, William Joiner, aged 16, Canterbury Church of England Young Men's L.I., Attorney's Clerk—Arithmetic (3rd)
515—Land, Mary, aged 20, St. Peter's Evening School, Derby, Pupil Teacher—Domestic Economy (1st)
72—Larrad, Joseph, aged 32, Wakefield M.I., Prison Officer—Book-keeping (1st)
234—Latchmore, George, aged 22, Hitchin M.I., Banker's Clerk—Geography (2nd)
546—Law, William, aged 23, Glasgow Athenæum, Letter Sorter—English Literature (3rd)
798—Lawson, James, aged 22, Willenhall Lit. Inst., Grocer's Assistant—Arithmetic (2nd)
173—Lee, Thomas, aged 23, Leeds Young Men's Christian Institute, Warehouseman—Book-keeping (1st)
398—Lees, John Marlor, aged 20, Henshaw-street Mutual Improvement Soc., Oldham, Minder—Book-keeping (3rd)
36—Legg, George, aged 20, London M.I., Butcher—French (1st) with 1st prize
314—Leggoe, Frederick Edwin, aged 18, People's College, Sheffield, Merchant's Clerk—Arithmetic (1st)
123—Leonard, Edward, aged 17, Rotherham Young Men's Christian Inst., Pupil Teacher—Geography (3rd)
432—Levy, Joseph Hiam, aged 22, Sussex Hall Evening Classes, Fancy Warehouseman—Arithmetic (1st)
561—Lightbody, John, aged 22, Glasgow Athenæum, Mercantile Clerk—Arithmetic (1st); English Literature (2nd)
763—Lilley, John, aged 20, Wolverhampton W.M. Coll., Grocer—Arithmetic (1st); Book-keeping (1st)
742—Lines, Richard, aged 16, Brompton Ch. of Eng. Young Men's Inst., Pupil Teacher—Arithmetic (3rd); Geography (2nd)
449—Lloyd, Thomas John, aged 19, Sussex Hall Evening Classes, Clerk—Arithmetic (3rd)
416—Logan, Colin, aged 28, Royal Polytechnic Inst. Classes, Clerk—French (3rd)
73—Logan, Henry, aged 20, Wakefield M.I., Iron-moulder—Arithmetic (1st); Book-keeping (1st); Mensuration (2nd); Algebra (3rd)
500—Lord, William, aged 26, Ipswich M.I., Bookseller's Assistant—Arithmetic (1st)
201—Lowden, Joseph, jun., aged 18, Leeds Young Men's Christian Inst., Cloth Finisher—Arithmetic (3rd); Book-keeping (1st)
131—McCann, John George, aged 20, Wigan M.I., Clerk—Arithmetic (1st); Book-keeping (1st)
52—McCord, William, aged 17, Newcastle-on-Tyne Church of England Inst.—Arithmetic (3rd); Geography (1st)
835—McCulloch, Archibald H., aged 17, Glasgow Inst., Clerk—Latin and Roman History (1st)
584—McDonald, James, aged 21, Aberdeen M.I., Land Surveyor—Principles of Mechanics (2nd)
568—McDougall, John, aged 27, Glasgow Athenæum, Book-keeper—Book keeping (1st)
495—McGill, Francis, aged 20, Andersonian Inst., Glasgow, Paper-ruler—Chemistry (2nd)
512—McGough, John, aged 18, St. Peter's Evening School, Derby, Coachmaker's Apprentice—Arithmetic (3rd)
324—McKellar, David, aged 19, Glasgow M.I., Ship Draughtsman—Arithmetic (2nd)

339—McKinlay, William Bannatyne, aged 19, Glasgow M.I., Mercantile Clerk—Arithmetic (3rd)
848—McLay, William, aged 20, Glasgow Inst., Clerk—Latin and Roman History (2nd)
673—McLoughlin, James, aged 24, Salford W. M. Coll., Warehouseman—Arithmetic (3rd)
674—McLoughlin, Thomas, aged 22, Salford W. M. Coll., Book-keeper—Book-keeping (1st)
351—McNicol, Peter, aged 19, Glasgow M.I., Clerk—Arithmetic (2nd)
540—McPherson, Daniel, aged 24, Glasgow Athenæum, Clerk—English Literature (1st)
582—Macbean, Cameron Edward, aged 16, Aberdeen M.I.—Arithmetic (2nd)
248—MacCarthy, Justin, aged 21, Liverpool I., Customs Clerk—Agriculture (3rd)
472—Macfadyen, William R., aged 16, Andersonian Inst., Glasgow, Accountant's Clerk—Chemistry (3rd)
854—Macfarlane, David, aged 22, Glasgow Inst., Clerk—Political Economy (2nd)
334—MacGibbon, John Manderson, aged 18, Glasgow M.I., Architect's Apprentice—Geometry (2nd)
325—Macintyre, Robert, aged 20, Glasgow M.I., Book-keeper—Book-keeping (2nd)
332—Mackenzie, Charles, aged 22, Glasgow M.I., Measurer—Arithmetic (3rd)
586—MacKillican, John, aged 28, Aberdeen M.I., Watchmaker—Algebra (3rd)
251—MacKnight, Edward, aged 22, Liverpool I., Mercantile Clerk—English History (3rd); French (3rd)
831—Macnaught, James Robert, aged 17, Glasgow Inst., Clerk (Shipbroker's)—French (2nd)
441—Marriott, Joseph, aged 26, Sussex Hall Evening Classes, Clerk—Music (2nd)
125—Marsden, William James, aged 34, Wigan M.I., Commercial Clerk—Book-keeping (1st)
517—Marsh, William James, aged 17, Pembroke Dock M.I., Shipwright—Arithmetic (3rd); Algebra (3rd)
275—Matheson, John Wilson, aged 24, Manchester M.I., Book-keeper—Book-keeping (2nd)
643—May, Thomas, aged 32, Leeds M.I., Mechanic—Conic Sections (3rd); Algebra (2nd)
55—Mean, Nicholas, aged 20, Newcastle-on-Tyne M.I., Clerk—Book-keeping (2nd)
199—Meek, William Todd, aged 18, Leeds Young Men's Christian Inst., Clerk—Arithmetic (3rd); Book-keeping (3rd)
359—Messenger, William, aged 19, Carlisle Young Men's Christian I., Draper—English History (3rd)
316—Midgley, Joseph, aged 24, People's College, Sheffield—Book-keeping (3rd); French (3rd)
6—Midgley, Samuel, aged 19, Bradford M.I., Warehouseman—English History (2nd)
776—Miles, Richard, aged 28, Stourbridge M.I., Engine Driver—Arithmetic (3rd); Book-keeping (3rd)
572—Millar, William James, aged 22, Glasgow M.I., Collector—Magnetism, Electricity, and Heat (3rd)
346—Miller, Adam, aged 22, Glasgow M.I., Optician—Magnetism, Electricity, and Heat (2nd)
846—Miller, Jessie, aged 16, Glasgow Inst.—Domestic Economy (2nd)
736—Miller, George William Neville, aged 31, Barnet Institute, Carpenter—Mensuration (3rd)
526—Miller, John, aged 24, Newcastle-on-Tyne, Church of England I., Engineer—Geography (3rd)
581—Milne, Alexander, aged 18, Aberdeen M.I., Ironmonger—Arithmetic (3rd)
593—Milne, George, aged 38—Abeerdeen M.I., General Agent—Chemistry (3rd)
702—Milner, Joseph, 23, Halifax W. M. College, Overlooker—Arithmetic (3rd)
661—Mills, Joseph William, aged 18, Watt Institute, Portsea—Navigation and Nautical Astronomy (1st) with 1st Prize; Trigonometry (2nd)
359—Mills, William, aged 29, Glasgow M.I., Shopman—Chemistry (1st); French (2nd)
108—Milward, James, aged 25, Deptford, Druggist—English History (1st); English Literature (1st)
378—Mitchell, George Edward, aged 16, Devonport M.I., Shipwright's Apprentice—Arithmetic (1st); Algebra (1st); Mensuration (2nd)
149—Mitchell, Joseph, aged 16, Leicester Church of England I., Chemist's Apprentice—Algebra (3rd); Latin and Roman History (3rd)
87—Moorton, Henry, aged 23, Farnham, Teacher—Arithmetic (3rd)
48—Moses, Christopher, aged 30, Middlesbro' M.I., Brick and Tile Maker—Book-keeping (1st)
819—Mulcaster, George, aged 20, Messrs. Chance's Library, Birmingham, Boat Guager—Book-keeping (3rd)
522—Mumford, Thomas, aged 19, Pembroke Dock M.I., Pupil Teacher—Arithmetic (1st); Geography (1st)
833—Murray, Alexander, aged 24, Glasgow Inst., Bank Clerk—French (1st)
186—Myers, Thomas, aged 22, Leeds Young Men's Christian Inst., Clerk—Algebra (1st), with 1st prize
185—Naylor, Edwin Rattenbury, aged 21, Leeds Young Men's Christian Inst., Clerk—Arithmetic (3rd); Book-keeping (3rd)
253—Neilson, George Hume, aged 27, Liverpool I., Letter Carrier—Algebra (3rd)
784—Nevey, Charles Burns, aged 21, West Bromwich Young Men's Christian Inst., Clerk—Arithmetic (1st); Book-keeping (1st); Algebra (2nd)
2—Newboult, Alfred, aged 16, Bradford M.I., Clerk—Arithmetic (3rd)
115—Noble, Frederic Edward, aged 24, Peterborough M.I., Cathedral Lay Clerk—Music (3rd)
22—Noble, John, aged 20, Carlisle Church of England I., Chemist and Druggist—Chemistry (2nd); Latin and Roman History (3rd)
39—Norris, George M., aged 19, London M.I., Clerk—Book-keeping (1st)
797—North, Henry, aged 18, Walsall W.M. Coll., Clerk—Algebra (3rd); Latin and Roman History (2nd)
118—Norton, Francis, aged 20, Rotherham Young Men's Christian Inst., Draughtsman—Freehand Drawing (3rd)
70—Nowers, Thomas William, aged 16, Wakefield M.I., Clerk—Arithmetic (1st); Book-keeping (2nd); Algebra (2nd); Geography (2nd)
98—Nunn, Edward, aged 22, Bristol Young Men's Christian Association, Engine-fitter—Book-keeping (2nd)
623—Nuttall, John, aged 20, Leeds M.I., Book-keeper—Arithmetic (2nd)
418—Orme, Joseph John, aged 25, Royal Polytechnic Inst. Classes, Dressing-Case Maker—French (3rd)
792—Overton, Frederick Job, aged 18, Walsall W. M. Coll., Saddler's Ironmonger—French (3rd)
875—Owers, Alfred, aged 18, Chelmsford M.I., Pupil Teacher—Freehand Drawing (3rd)
189—Oxley, William, aged 18, Leeds Young Men's Christian Inst., Pupil Teacher—Arithmetic (2nd)
25—Parker, Edward Joshua, aged 16, Carlisle Church of England I., Chemist and Druggist—French (3rd)
781—Partridge, Thomas, aged 17, West Bromwich Young Men's Christian Inst., Brassfounder—Arithmetic (3rd)
731—Paterson, Arthur William, aged 17, Barnet Institute, Bricklayer—Arithmetic (3rd)
830—Paterson, John Alexander, aged 18, Glasgow Inst., Clerk—Algebra (3rd)
369—Paton, James Richmond, aged 17, Glasgow M.I., Clerk—Book-keeping (1st); German (2nd)
858—Payne, James, jun., aged 23, Blandford Lit. Inst., Attorney's Clerk—Book-keeping (1st); Algebra (2nd); English History (3rd); Logic and Mental Science (3rd)

323—Peacock, Thomas, aged 24, Glasgow M.I., Optician—Magnetism, Electricity, and Heat (3rd)
503—Pearce, Frederic, aged 16, Ipswich M.I., Accountant's Clerk—Book-keeping (1st)
502—Pearce, Robert, aged 21, Ipswich M.I., Attorney's Articled Clerk—French (3rd)
496—Pearce, Stephen, aged 18, Ipswich M. I., Merchant's Clerk—Book keeping (1st)
723—Pearson, Henry, aged 19, Halifax M.I., Time-keeper—Algebra (3rd); Book-keeping (2nd)
713—Pearson, Howard Shakespeare, aged 22, Birmingham and Midland I., Stationer—English History (1st); French (1st)
250—Pearson, John, aged 16, Liverpool I., Apprentice—Arithmetic (3rd)
236—Penn, Harry, aged 18, Hitchin M.I., Linendraper—English History (3rd)
233—Penn, William, aged 22, Hitchin M.I., Assistant in Observatory—Astronomy (2nd)
595—Peterkin, Henry, aged 16, Aberdeen M.I., Clerk—Free-hand Drawing (3rd)
86—Phillips, Henry, aged 19, Farnham Young Men's Inst., Auctioneer—Book-keeping (2nd)
849—Phillips, James, aged 22, Glasgow Inst., Pattern Drawer—Free-hand Drawing (2nd)
853—Philp, Robert, aged 19, Glasgow Inst., Wine Merchant—French (2nd)
466—Phyn, Alexander, aged 21, Popular Evening Classes, Andersonian Inst., Glasgow, Assistant Teacher—Arithmetic (2nd); Algebra (3rd); Geometry (3rd)
182—Pickard, Ambrose, aged 22, Leeds Young Men's Christian Inst., Clerk—Book-keeping (3rd)
172—Pickard, John Wood, aged 26, Leeds Young Men's Christian Inst., Cashier—English History (1st)
292—Pinkerton, James, aged 20, Paisley Artizan's Inst., Ironmonger—Arithmetic (1st); Logic and Mental Science (3rd)
289—Pinkerton, Robert, aged 26, Paisley Artisan's Inst., Tinsmith—Music (2nd)
290—Pollock, David C., aged 20, Paisley Artisan's Inst., Drawer—Music (3rd)
242—Powell, Edward, aged 20, Liverpool I., Watchmaker—English History (3rd); English Literature (2nd)
76—Power, John, aged 17, Waterford M.I., Clerk—Arithmetic (1st)
710—Prosser, William Henry, aged 17, Birmingham and Midland I., Engineer's Apprentice—Principles of Mechanics (3rd); Practical Mechanics (3rd)
379—Pryor, John, aged 17, Devonport M.I., Shipwright's Apprentice—Arithmetic (1st); Algebra (2nd); Mensuration (3rd)
64—Pullin, Joseph S., aged 16, Richmond Parochial Library, Civil Service—Arithmetic (3rd); French (3rd)
446—Questel, Charles, aged 17, Sussex Hall Evening Classes, Clerk—Latin and Roman History (2nd)
349—Rae, Andrew Neill, aged 24, Glasgow M.I., Book-keeper—Chemistry (1st)
603—Rae, John, aged 23, Aberdeen M.I., Operative Tobacconist—Book-keeping (2nd)
41—Raisin, William Lawrence, aged 18, London M.I., Ornamental Engraver—Arithmetic (1st); French (1st)
44—Ravenscroft, Francis, aged 31, London M.I., Clerk—Arithmetic (3rd)
109—Reddicliffe, Roger, aged 24, Blackheath-road, Police Constable—Arithmetic (2nd)
382—Reed, Charles Frederic, aged 21, Devonport M.I., Boot and Shoemaker—Algebra (3rd)
814—Reeves, Frederick, aged 20, Messrs. Chance's Library, Birmingham, Glass-cutter—Latin and Roman History (1st) with 2nd Prize
821—Richards, Joseph, aged 21, Messrs. Chance's Library, Birmingham, Fitter and Machinist—Arithmetic (3rd)
69—Richards, Thomas, aged 22, Wakefield, M.I., Carpet Weaver—Arithmetic (1st); Algebra (2nd)
692—Richardson, Charles James, aged 22, Halifax W. M. Coll., Clerk—Book-keeping (2nd)
374—Rickard, George James, aged 17, Devonport M.I., Shipwright's Apprentice—Arithmetic (1st); Algebra (3rd)
381—Rickard, George Pearn, aged 18, Devonport M.I.—Book-keeping (3rd; Algebra (2nd); Geography (2nd); English History (1st)
352—Riley, Alexander, aged 21, Glasgow M.I., Merchant's Clerk—Arithmetic (1st); Book-keeping (1st)
551—Rintoul, Robert, aged 22, Glasgow Athenæum, Clerk—English Literature (1st)
3—Rishworth, William, aged 20, Bradford M.I.—Book-keeping (3rd)
841—Roberton, John, aged 23, Glasgow Inst., Clerk—French (2nd)
675—Roberts, Edward, aged 21, Salford W. M. Coll, Warehouseman—Book-keeping (3rd)
800—Roberts, John, aged 16, Bilston Inst., Pupil Teacher—Arithmetic (1st); Algebra (3rd); Geography (3rd)
15—Roberts, Joseph Seed, aged 20, Bradford M.I., Cabinetmaker—Book-keeping (2nd); Astronomy (3rd)
33—Roberts, William, aged 28, Holmfirth M.I., Woollen Cloth Weaver—Mensuration (3rd)
725—Robertshaw, Alfred, aged 18, Halifax M.I., Warehouseman—French (2nd)
458—Robertson, Henry, aged 16, Popular Evening Classes, Andersonian Inst., Glasgow, Chemist (practical)—Chemistry (3rd)
832—Robertson, William Oswald, aged 16, Glasgow Inst., Assistant Salesman—French (2nd)
180—Robinson, Charles, aged 24, Leeds Young Men's Christian Inst., Warehouseman—English Literature (1st)
810—Robinson, James, aged 17, Messrs. Chance's Library, Birmingham, Clerk—Arithmetic (3rd); Book-keeping (2nd)
629—Robinson, Thomas Walton Hartley, aged 16, Leeds School of Art, Art Student—Freehand Drawing (3rd)
796—Rogers, Henry William, aged 18, Walsall W. M. Coll., House Painter—Music (2nd)
683—Rooke, George, aged 25, Nottingham M.I., Schoolmaster—Algebra (2nd)
424—Rudler, Frederick William, aged 20, Royal Polytechnic Inst. Classes, Solicitor's Clerk—Animal Physiology (1st) with 1st Prize
37—Rundell, Joseph Benjamin, aged 26, London M.I., Government Clerk—Conic Sections (2nd)
117—Rushforth, John Thomas, aged 16, Rotherham Young Men's Christian I., Turner and Stove Fitter—Arithmetic (3rd)
358—Russell, George, aged 21, Glasgow M.I., Mechanical Engineer—Geometry (2nd)
9—Rycroft, John Denison, aged 16, Bradford M.I., Book-keeper's Assistant—English History (2nd)
733—Samuel, Thomas, aged 25, Barnet Institute, Clerk in Registrar's Office, Court of Chancery—Arithmetic (2nd)
279—Saunders, George Henry, aged 25, Manchester M.I., Warehouseman—French (3rd)
428—Scott, James, aged 21, Carlisle Church of England Inst., Commercial Clerk—Book-keeping (1st)
80—Sexton, Thomas, aged 16, Waterford M.I., Clerk—Arithmetic (1st)
684—Shacklock, Samuel, aged 20, Trinity W. M. Assoc., Nottingham, Plumber—Arithmetic (3rd); Algebra (3rd)
124—Shaw, Thomas, aged 22, Wigan M.I., Banker's Clerk—Book-keeping (1st)
34—Shaw, William Sykes, aged 17, Holmfirth M.I., Pupil Teacher—Arithmetic (2nd); Geography (2nd)
363—Shekleton, Abraham, aged 34, Glasgow M.I., Book-keeper—Book-keeping (2nd)

640—Sherwin, Hugh, aged 31, Leeds M.I., Commercial Clerk—Book-keeping (1st)
176—Shillito, Michael, aged 18, Leeds Young Men's Christian Inst., Mechanic—Algebra (1st)
119—Shillitoe, Wilson, aged 18, Rotherham Young Men's Christian Inst., Pupil Teacher—English History (3rd); Music (3rd)
222—Shrubsole, William Hobbs, aged 23, Sheerness M.I., Grocer—Music (2nd)
300—Shutt, Richard, aged 38, People's College, Sheffield, Saddler—Algebra (2nd); Latin and Roman History (2nd)
141—Skelton, John Henry, aged 17, Ashford S. E. Railway M.I., Railway Clerk—Book-keeping (1st); Mensuration (3rd)
427—Skinner, John, aged 36, Carlisle Church of England Inst., Shopman—Book-keeping (3rd)
280—Sidebotham, Samuel, aged 21, Manchester M.I., Clerk—French (3rd)
755—Silvers, George Henry, aged 18, Dudley Educational Inst., Clerk—Arithmetic (2nd)
785—Silvester, William, aged 21, West Bromwich Young Men's Christian Inst., Clerk—Arithmetic (3rd)
574—Simpson, William, aged 17, Glasgow M.I., Clerk—English History (2nd)
521—Sinnett, James Lewis, aged 17, Pembroke Dock M.I., Shipwright—Arithmetic (3rd)
487—Sloan, John, aged 29, Popular Evening Classes, Andersonian Inst., Glasgow, Jacquard Power-loom tenter—Magnetism, Electricity, and Heat (3rd)
132—Smalley, James, aged 44, Wigan M.I., Tailor and Draper—Music (3rd)
128—Smalley, William, aged 16, Wigan M.I., Tailor and Draper—Arithmetic (2nd); Geography (2nd)
667—Smethurst, James, aged 35, Salford W. M. College, Coremaker—Chemistry (3rd)
756—Smith, Benjamin, aged 20, Dudley Educational Inst., Clerk—Arithmetic (2nd); Mensuration (3rd)
47—Smith, David, aged 20, Middlesbro' M.I., Engine Fitter—Algebra (3rd)
92—Smith, Edmond William, aged 36, Shaw Farm Inst., Attendant on Machinery—English History (2nd)
43—Smith, Henry, aged 20, London M.I., Cabinet-maker—Arithmetic (3rd)
531—Smith, Hugh McLaren, aged 16, People's Reading Rooms, Belfast, Teacher—Arithmetic (2nd); Algebra (1st)
639—Smith, James, aged 17, Leeds Church Inst., Pupil Teacher—Geography (2nd)
24—Smith, James, aged 18, Carlisle Church of England Inst., Pupil Teacher—Arithmetic (2nd)
97—Smith, James Jenkins, aged 20, Bristol Young Men's Christian Association—Book-keeping (1st)
869—Smith, James Rigley, aged 20, Sussex Hall Evening Classes, Shoemaker—English History (1st)
836—Smith, John Stewart, aged 20, Glasgow Inst., Clerk—Arithmetic (3rd)
532—Smith, Robert, aged 16, People's Reading Rooms, Belfast, Lithographic Artist—Algebra (3rd); Free-hand Drawing (2nd)
281—Smith, Samuel, aged 17, Manchester M.I., Junior Clerk—Arithmetic (2nd); Algebra (3rd)
444—Smith, Thomas, aged 18, Sussex Hall Evening Classes, Clerk—Book-keeping (1st) with 1st Prize.
793—Smith, William, aged 16, Walsall W. M. Coll., Pork Butcher—Arithmetic (2nd)
588—Smith, William, aged 19, Aberdeen M.I., Iron Turner—Algebra (3rd); Principles of Mechanics (3rd)
153—Sneath, George, aged 18, Leicester Church of England I., Accountant's Clerk—Arithmetic (2nd); Algebra (2nd)
60—Sowden, Thomas Henry, aged 20, Newcastle-upon-Tyne M.I., Clerk—Book-keeping (2nd); Algebra (3rd); English History (2nd)
249—Spence, Samuel, aged 19, Liverpool I., Warehouseman—Arithmetic (3rd)
380—Spiller, William, aged 17, Devonport M.I., Shipwright's Apprentice—Book-keeping (2nd); Algebra (2nd); Geometry (3rd)
579—Stannah, Joseph, aged 24, Worcester Catholic Institution, Surveyor's Assistant—Arithmetic (3rd)
14—Stead, John, aged 17. Bradford M.I., Grocer—Arithmetic (3rd)
703—Steele, John, aged 23, Clerkenwell W. M. Inst., Inland Revenue—Chemistry (1st) with 1st Prize; Magnetism, Electricity, and Heat (2nd)
429—Stent, William Herbert, aged 16, Warminster Athenæum, Architect—Chemistry (3rd); Latin and Roman History (1st)
837—Steven, William, aged 23, Glasgow Inst., Teacher—Latin and Roman History (1st)
554—Stevenson, Andrew McMath, aged 19, Glasgow Athenæum, Clerk—English Literature (3rd)
845—Stewart, John, aged 23, Glasgow Inst., Clerk—French (1st) with 2nd Prize.
483—Stewart, William, aged 18, Popular Evening Classes, Andersonian Inst., Glasgow, Student of Medicine—Chemistry (2nd)
397—Stopford, James, aged 30, Henshaw-street Mutual Improvement Society, Oldham—Self-actor minder—Arithmetic (3rd)
412—Stott, Robert, aged 18, St. Stephen's Evening School, Westminster, Teller in Stamp Office—Arithmetic (2nd)
580—Strachan, James, aged 20, Aberdeen M.I., Architectural Student—Mechanical Drawing (3rd); Free-hand Drawing (2nd)
838—Straine, George, aged 24, Glasgow Inst., Pianoforte-maker—Music (3rd)
527—Stratton, Robert, aged 23, Newcastle-on-Tyne Church of England I., Schoolmaster—Arithmetic (1st); Algebra (2nd); Geography (1st); English Literature (1st)
91—Stroud, Robert, aged 18, Farnham Young Men's Inst., Teacher—Arithmetic (1st); Algebra (2nd); Geography (1st)
687—Suggett John Dix, aged 18, Stanley Library, King's Lynn, Bankers' Clerk—Arithmetic (3rd)
700—Sutcliffe, Samuel, aged 17, Halifax W.M. Coll., Cabinet-maker—Arithmetic (2nd)
355—Sutherland, John, aged 21, Glasgow M.I., Soap-maker—Chemistry (3rd)
697—Sutton, James, aged 20, Halifax W.M. Coll.. Overlooker—English Literature (2nd)
618—Sutton, John, aged 16, Leeds Church Institute, Pupil Teacher—Arithmetic (2nd)
136—Swarbrick, Thomas, aged 19, Wigan M.I., Clerk—Arithmetic (2nd)
343—Tait, James, aged 20, Glasgow M.I., Engineer—Arithmetic (2nd)
411—Tapp, John George William, aged 16, St. Stephen's Evening School, Westminster, Pupil Teacher—Arithmetic (2nd); Algebra (3rd)
16—Taylor, James, jun., aged 17. Bradford M.I., Overlooker—Algebra (3rd)
282—Taylor, Joseph, aged 18, Manchester M.I., Clerk—Arithmetic (3rd)
860—Telford, Watson, aged 18, Carlisle Young Men's Christian I., Pupil Teacher—English History (1st)
801—Thompson, Isaac Alfred, aged 19, Bilston Inst., Mechanical Draughtsman—Practical Mechanics (3rd)
63—Thomson, John Gordon, aged 15, Richmond Young Men's Inst., Civil Service—English History (2nd); Geography (2nd)

196—Thorp, Joseph, aged 19, Leeds Young Men's Christian Inst., Mechanic—Arithmetic (3rd); Algebra (2nd)
194—Tiffany, John Barnes, aged 17, Leeds Young Men's Christian Inst., Tobacco Manufacturer—Arithmetic (2nd)
877—Tisley, Samuel Charles, aged 31, London M.I., Clerk—Arithmetic (1st); Book-keeping (2nd)
690—Toothill, Abel, aged 17, Halifax W. M. Coll., Clerk—Arithmetic (3rd); Book-keeping (2nd)
724—Toothill, James Arnold, aged 23, Halifax M.I., Assistant Teacher—Book-keeping (3rd)
476—Todd, William, aged 20, Popular Evening Classes, Andersonian Inst., Glasgow, Book-keeper—Book-keeping (1st)
283—Torkington, Ben, aged 23, Manchester M.I., Railway Clerk—Book-keeping (1st)
631—Townsley, Thomas Moore, aged 18, Leeds School of Art, Art Student—Free-hand Drawing (2nd)
187—Trant, William, Jun., aged 17, Leeds Young Men's Christian Institute, Clerk—Geometry (2nd)
519—Trevena, Henry, aged 21, Pembroke Dock M.I., Shipwright—Arithmetic (3rd); Algebra (2nd); Mensuration (3rd)
436—Troughton, James, jun., aged 18, Sussex Hall Evening Classes, Merchant's Clerk—Arithmetic (3rd); Book-keeping (1st)
485—Turnbull, George, aged 25, Popular Evening Classes, Andersonian Inst., Glasgow, Clerk—Arithmetic (1st); Book-keeping (1st)
192—Turner, Andrew, aged 20, Leeds Young Men's Christian Inst., Letter Press Printer—Book-keeping (3rd)
559—Turner, John, aged 24, Glasgow Athenæum, Warehouseman—English Literature (1st)
497—Turner, John Harris, aged 20, Ipswich M.I., Art Pupil Teacher—English Literature (3rd)
622—Turner, Thomas Burton, aged 21, Leeds M.I., Solicitor's Clerk—Book-keeping (1st)
604—Urquhart, John, aged 20, Aberdeen M.I., Clerk—Arithmetic (3rd); Algebra (3rd)
601—Urquhart, Peter, aged 18, Aberdeen M.I., Clerk—French (1st)
592—Valentine, John Sutherland, aged 18, Aberdeen M.I., Clerk—Arithmetic (3rd); Algebra (2nd); Principles of Mechanics (3rd)
284—Varley, Henry, aged 27, Manchester M.I., Warehouseman—Algebra (2nd); Book-keeping (1st)
450—Vaughan, William, aged 20, Sussex Hall Evening Classes, Clerk—Geometry (1st) with 1st Prize
328—Wade, James, aged 23, Glasgow M.I., Architect—Music (1st) with 1st Prize; French (3rd)
12—Waddington, Albert, aged 18, Bradford M.I., Clerk—Arithmetic (3rd); Book-keeping (3rd)
200—Wainwright, Henry, aged 17, Leeds Young Men's Christian Inst., Clerk—Arithmetic (3rd)
285—Walker, Edward, aged 17, Manchester M.I., Architect—Algebra (3rd); Geometry (3rd)
688—Walker, John, aged 21, Halifax W.M. Coll., Warehouseman—Arithmetic (3rd); Book-keeping (2nd)
7—Walker, John Atkinson, aged 16, Bradford M.I., Sawyer—Arithmetic (3rd)
612—Walker, Thomas, jun., aged 33, Shipley Mechanics' Institution, Commission Agent—Book-keeping (3rd)
533—Wallace, James, aged 16, People's Reading Rooms, Belfast, Grocer—Arithmetic (2nd); Algebra (2nd); Mensuration (3rd)
799—Wallford, William, aged 16, Bilston Inst., Pupil Teacher—Arithmetic (3rd); Algebra (3rd)
42—Wallington, Emma Susannah Sophia, aged 22, London M.I.—English History (2nd)
26—Walton, Robert, aged 17, Carlisle Church of England Inst., Clerk—Book-keeping (2nd)
686—Walton, Thomas, aged 33, Nottingham M.I., Schoolmaster—Arithmetic (2nd)
121—Warburton, Isaac, aged 28, Rotherham M.I., Machinist—Music (3rd)
111—Warcup, Albert, aged 18, Deptford M.I., Shipowner's Clerk—English History (3rd)
452—Warington, George, aged 20, Sussex Hall Evening Classes, Assistant Chemist—Magnetism, Electricity, and Heat (1st); German (1st), with 1st Prize
205—Warren, Jane, aged 20, Macclesfield Useful Knowledge Society, Dressmaker—Domestic Economy (2nd)
342—Watson, James, aged 17, Glasgow M.I., Clerk—Arithmetic (3rd)
49—Weddell, John, aged 19, Middlesbro' M.I., Engine Fitter—Free hand Drawing (3rd)
861—Wetherell, William, aged 17, Carlisle Young Men's Christian I., Pupil Teacher—English History (2nd)
50—Whales, Jonathan, aged 16, Middlesbro' M.I., Clerk—Arithmetic (1st)
51—Whales, Thomas, aged 18, Middlesbro' M.I.,—Arithmetic (2nd); Algebra (2nd); Chemistry (3rd)
372—White, George Henry, aged 19, Shipwright's Apprentice—Arithmetic (3rd); Book-keeping (2nd); Algebra (2nd); Geometry (3rd)
377—White, William Henry, aged 16, Devonport M.I., Shipwright's Apprentice—Arithmetic (1st); Algebra (2nd); Mensuration (2nd)
504—White, William Orford, aged 25, Ipswich M.I., Dyer—Arithmetic (3rd); English Literature (3rd)
767—Wiley, Robert, aged 28, Wolverhampton W. M. Coll., Broker's Clerk—Book-keeping (1st)
169—Wilkinson, William Charles, aged 17, Burnley M.I., Book-keeper—Arithmetic (3rd)
421—Williams, Charles John, aged 16, Royal Polytechnic Inst. Classes, House Agent and Surveyor—Freehand Drawing (3rd)
286—Williams, Thomas, aged 19, Manchester M.I., Clerk—Arithmetic (2nd); Book-keeping (1st)
455—Williams, Thomas Frederick, aged 22, Sussex-hall Evening Classes, Attendant in Principal Librarian and Secretary's Office, British Museum—Arithmetic (2nd); Book-keeping (1st); French (1st)
165—Williamson, William, aged 19, Burnley M.I., Mechanic—Mensuration (3rd)
138—Wilson, Albert William, aged 17, York Inst., Railway Clerk—Book-keeping (1st)
331—Wilson, Charles, aged 23, Glasgow M.I., Clerk—Book-keeping (2nd)
348—Wilson, David, aged 23, Glasgow M.I., Engine Fitter—Magnetism, Electricity, and Heat (3rd)
140—Wilson, Edwin, aged 22, York Inst., Hosier—Book-keeping (2nd)
[illegible]—Wilson, Harry, aged 19, Darlington Church of England Inst., Railway Clerk—Arithmetic (3rd)
[illegible]—Wilson, John, aged 39, People's College, Sheffield, Penblade Grinder—Political and Social Economy (2nd)
70[illegible]—Wilson, John, aged 24, Birmingham and Midland I., Clerk—Arithmetic (3rd)
11—Winders, Joseph, aged 17, Bradford M.I., Wool Sorter—Arithmetic (3rd)
447—Withall, George Noble, aged 18, Sussex Hall Evening Classes, Clerk—Arithmetic (1st) with 1st prize
711—Wood, Clara Finetta, aged 19, Birmingham and Midland I., Governess—French (3rd)
127—Wood, James Alexander, aged 18, Wigan M.I., Clerk—Arithmetic (3rd)
130—Wood, James Lee, aged 18, Wigan M.I., Clerk—Arithmetic (3rd)
288—Wood, Joseph, aged 19, Manchester M.I., Clerk—Arithmetic (2nd)
308—Wood, William Martin, aged 31, People's College, Sheffield, Tea Dealer—English History (1st)
143—Woodland, Richard, aged 18, Ashford M.I., Railway Clerk—Book-keeping (1st); Algebra (3rd)

660—Woodman, Samuel James, aged 18, Watt Institute, Portsea, Engineer Apprentice—Navigation and Nautical Astronomy (1st) with 2nd Prize; Trigonometry (3rd)
511—Woollatt, Clementina, aged 18, St. Peter's Evening School, Derby, Pupil Teacher—English History (3rd)
383—Worth, Richard Nicholls, aged 23, Devonport M.I., Reporter—English History (1st) with 1st Prize; English Literature (1st) with 1st Prize
144—Wren, William, aged 40, Carshalton Mutual Improvement Society, Gardener—Arithmetic (2nd); Botany (1st) with 1st Prize
564—Wright, Alexander M., aged 18, Glasgow Athenæum, Clerk—Book-keeping (2nd)
106—Wright, Emily Terrett, aged 16, Bristol Athenæum—French (3rd)
107—Wright, Sarah Hartland, aged 18, Bristol Athenæum—French (2nd)
198—Yeadon, Oliver, aged 18, Leeds Young Men's Christian Inst., Mechanic—Astronomy (3rd)
539—Young, Andrew, aged 18, Glasgow Athenæum, Clerk—English Literature (1st) with 2nd Prize
478—Young, James Wallace, aged 18, Popular Evening Classes, Andersonian Institute, Glasgow, Dispenser—Chemistry (1st)
555—Young, Robert, aged 17, Glasgow Athenæum, Stationer's Assistant—English History (2nd)
714—Zair, George, aged 22, Birmingham and Midland I., Manufacturer—French (1st)

Home Correspondence.

MR. MACGREGOR'S PAPER ON THE HYTHE SCHOOL OF MUSKETRY.

Sir,—With reference to the meeting of the 15th insatnt, I beg to state that triggers upon the principle advocated by Mr. Scott, have been used by me since last autumn, when I submitted them to the War Department.

I am, &c.,
MATTHEW PARIS, Civil Service Volunteers.

Proceedings of Institutions.

Glasgow Mechanics' Institution.—The annual meeting of the friends of this Institution was held on Tuesday, 21st May, in the hall of the Institution—the Lord Provost in the chair. There was a numerous attendance of the students and their relations; and among those present were—Bailie Couper, Bailie Blackie, Bailie Ure; the Deacon-Convener, Councillor Salmon; Messrs. D. Moore, Peter Hamilton, John M'Dougall, Wm. Swanston, Jas. Inglis, John Mossman, and the lecturers and teachers. The Lord Provost stated that this was the thirty-eighth annual meeting of this Institution. It had progressed from year to year successfully and prosperously, and he was glad to say that the report for the past year was the most satisfactory one that had yet been produced. He would be very much disappointed if such were not the result, when they took into consideration the extreme assiduity and energy of the gentlemen who directed the various operations of the Institution, and also when they took into account the talent of the several lecturers who from day to day instilled principles and education into the minds of the young, and even of those of a more advanced period in life. One thing, however, extremely gratified him that day, and that was that he had had an opportunity, accompanied by Bailie Couper, of going through their very magnificent new rooms in Bath-street, and, as representative of the city, he had to thank, not only them, but their directors, for having added one more architectural laurel to adorn the city. As head of the corporation, he felt that they lay, even on that ground alone, under great obligations to the committee of management, and when they considered the results that were sure to flow from the opening of that Institution—that age after age was to receive from the lips of able and talented men what was to make a young and rising youth useful in their day and generation—they had to thank Providence that put it into the hearts of friends around them to exert themselves to procure such a valuable Institution.—Mr. M'Dougall, Secretary, read the annual report, which stated that in many respects the session just terminated had proved one of the most successful since the establishment of the Institution. The new buildings in Bath-street would be ready for occupation in a short time; and although a considerable sum as interest of debt, together with an increase of working expenses, must to some extent burden the Institution, the directors were hopeful that in the course of a year or two the inhabitants of Glasgow, and particularly its merchant princes, who were so much indebted to the class whose interests the Institution was specially intended to forward, would give them assistance in clearing off this debt. Among the educational institutions throughout the kingdom in union with the Society of Arts, London, the Glasgow Mechanics' Institution occupied a very high place. 53 students this session has been enrolled as candidates. The number of tickets sold for the various classes in the Institution was 1,423, being an increase of 189 over last year. The income of the Institution for the past year was £716.—On the motion of Bailie Couper, seconded by Mr. P. Hamilton, the report was adopted.—Mr. Sheriff Bell, after referring to the deep interest he had always taken in this Institution, and to the removal to the more commodious and more beautiful premises in Bath street, hinted that there was a possibility of the Chancellor of the Exchequer being present at the public opening of the new building. After recommending for the perusal of the young men the work of Dr. Craik, Belfast, on "The Pursuit of Learning under Difficulties," Dr. Smiles' "Self Help," and the Recorder of Birmingham's volume, entitled "Our Exemplars," the learned Sheriff proceeded to point out the importance of energy and perseverance in the pursuit of knowledge, and concluded as follows:—I can assure you that nothing delights me more than to see the earnest brow and the busy, forward-looking eye of youth, when hope is high and the whole world is before them. You have that blessed futurity, if you choose to make it blessed, and I trust in God you will use your exertions to do so. And then, whatever becomes of your temporal interests in life, you will at all events feel that you have done your duty, morally and intellectually, and endeavoured, as far as in you lay, to prepare yourself for a higher and a better world. With these sentiments, allow me to propose this resolution:—"That the Glasgow Mechanics' Institution, in respect of its vast usefulness to the citizens of Glasgow in promoting the arts and sciences, and being about to remove to more commodious premises, is entitled to an increase of public support."—Councillor Salmon seconded the motion, which was approved of.—The Lord Provost then distributed the prizes gained by successful students. Contributions of books, &c., were then presented to the Institution, and votes of thanks having been accorded to the Local Board of the Society of Arts, the office-bearers of the Institution, and the Lord Provost, the meeting separated.

MEETINGS FOR THE ENSUING WEEK.

MON. ...Royal Inst., 2. General Monthly Meeting. 8. Mr. C. T. Newton, "On the Sculptures of the Mausoleum at Halicarnassus, lately deposited in the British Museum."
Entomological, 8.
United Service Inst., 8½. Captain C. P. Coles, "The Construction of Iron-cased Ships," a Supplement to the Lecture of June 29, 1860.

TUES. ...Royal Inst., 3. Mr. John Hullah, "On the History of Modern Music."
Ethnological, 8. 1. Mr. George Busk, F.R.S., "On a Systematic Mode of Craniometry." 2. Mr. G. R. H. Major, F.S.A., "On Australian Tradition."
Photographic, 8.
Civ. Engineers Inst., 9. President's Conversazione.

WED. ...Society of Arts, 8½. Mr. William Hawes, "On the International Exhibition of 1862."
Geological, 8.
Ethnological, 8½.

THURS...Royal Inst., 3. Mr. Pengelly, "On the Devonian Age of the World."
Linnæan, 8. 1. Dr. James Salter, "On certain sexual monstrosities in the genus *Passiflora*." 2. Mr. F. Smith, "On Hymenopterous Insects collected in the Islands of Ceram, Celebes, &c."
Chemical, 8. 1. Mr. Arthur W. Lennox, "On Bromide of Carbon." 2. Dr. Daubeny, "On the power possessed by the roots of plants of rejecting poisons, or abnormal substances presented to them."
Antiquaries, 8½.

FRI.......Archæological Inst., 4.
Royal Inst., 8. Professor Tyndall, "On the Physical Basis of Solar Chemistry."

SAT.......Royal Inst., 3. Prof. Max Muller, "On the Science of Language."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Num.

Delivered on 30th April, 1861.

131. Civil Service Estimates—General Abstract.
191. Aberdeen University—Return.
199. East India (Army Medical Department)—Return.

Delivered on 1st May, 1861.

144. Spirits—Returns (a Corrected Copy).
198. Magistrates in Holy Orders—Return.
200. Metropolitan Police—Return.
201. St. James's Parish—Copy of Correspondence.
302. Admiralty—Return.
204. Income and Property Tax, &c.—Account.
153. Weights and Measures—Abstract of Return.
99. Bill—Piers and Harbours.

Delivered on 2nd May, 1861.

152. Poor Law Appeals—Return.
205. Paper Duties, &c.—Return.

Delivered on 3rd May, 1861.

180. Poor Relief (England)—First Report from Committee.
197. National Portrait Gallery—Fourth Report of the Trustees.
209. Probate Act (District Registries)—Return.

Delivered on 4th and 6th May, 1861.

121. Superannuations (Public Offices)—Account.
186. Emigration (North American Colonies)—Return.
210. Civil Services—Estimate for Votes "On Account."
187. Enfield and Whitworth Committee—Return.
167. Landguard Point (Sand Deposit)—Return.
29. Railway and Canal Bills (179. London Tramway and Dispatch Company)—Board of Trade Report.
59. Bills—Aggravated Assaults Act Amendment.
60. „ —Cruelty to Animals Prevention.
118. „ —Industrial Schools (Ireland).
119. „ —Larceny, &c., as Amended by the Select Committee.
120. „ —Malicious Injuries to Property (as amended by the Select Committee.)
121. „ —Forgery (as amended by the Select Committee).
122. „ —Coinage Offences (as amended by the Select Committee).
123. „ —Accessories and Abettors (as amended by the Select Committee)
124. „ —Criminal Statutes Repeal (as amended by the Select Committee.)
Christians in Turkey—Reports from Her Majesty's Consuls.

Delivered on 7th May, 1861.

212. National Education (Ireland)—Copy of a Letter.
214. Metropolitan Improvements—Paper.
125. Bills—Criminal Proceedings Oath Relief.
126. „ —Naval Medical Supplemental Fund Society.

Delivered on 8th May, 1861.

215. Beer Licences—Returns.
219. Spithead Forts—Return.
221. Malt Duty—Return.
149. East India (Irrigation Works, &c.)—Return.
207. "The Warrior"—Copy of Correspondence.
128. Bill—Bills of Exchange and Promissory Notes (Ireland).
Italy—Correspondence respecting the Changes in Italian Tariffs.

Delivered on 9th May, 1861.

133. Courts of Probate (London and Dublin)—Account.
213. Army—Return.
220. British Museum—Account and Estimate.
225 Railway and Canal Bills—Sixth Report from Committee.
129. Bill—Princess Alice's Annuity.
Salmon Fisheries (England and Wales)—Maps.

SESSION 1860.

383 (A xi.) Poor Rates and Pauperism—Return (A).

Delivered on 10th May, 1861.

206. Navy (Gun Boats)—Return.
223. Harbours of Refuge—Detailed Statement.
110. Bills—Volunteers, Tolls Exemption (No. 2).
130. „ —Friendly and Assurance Societies.
131. „ —Post Office Savings Banks—Lords Amendment.
Fugitive Slave, Anderson—Correspondence.

Delivered on 11th and 13th May, 1861.

208. Exchequer—Account.
216. Conveyance of Mails (Galway and America)—Correspondence.
218. Army (Barracks)—Return.
226. National Educational Board (Ireland)—Return.
227. County Treasurers (Ireland)—Account.
240. Offences against the Person, &c., Bills—Report.
127. Bills—Landed Property Improvement, &c. (Ireland).
133. „ —Customs and Inland Revenue.
135. „ —Combination of Parishes Dissolution (Scotland) (amended).
136. „ —Markets (Ireland).
Mexico—Agreements entered into at Vera Cruz.
Mexico—Correspondence respecting British Claims on.

SESSION 1860.

602. Ecclesiastical Establishment (British North America)—Return.

Delivered on 14th May, 1861.

217. East India (Army)—Correspondence.
231. Education Commission—Letter.
239. Ship "Prince Consort"—Correspondence.
117. Bill—County Court Procedure.

Delivered on 15th May, 1861.

229. Manchester Parish—Return.
230. Aberdeen University—Resolutions.
232. East India (Importation of Salt)—Despatch from Sir Charles Wood.
237. Militia Surgeons, &c.—Return.
241. Richmond-park—Return.
245. Yeomanry—Detailed Statement of Expenditure per Regiment.
137. Bills—Public Offices Extension (as amended by Select Committee).
139. „ —Excise and Stamps.

Delivered on 16th May, 1861.

224. Civil Contingencies—Account and Estimate.
238. Army (Drying Rooms)—Return.
246 Tea—Account.
134. Bills—Drainage of Land.
138. „ —Labourers Cottages (amended).
141. „ —Holyhead-road (amended by the Select Committee).
Yeomanry Force—Report.

Delivered on 17th May, 1861.

60. Local Acts (69. South Yorkshire Railway (Keadley Extension)—Admiralty Report.
174. Grand Jury Presentments (Ireland)—Abstract of Account.
252. Sailors' Homes, &c.—Return.
256. Paper Mills—Return.
263 Exchequer Bills—Account.
140. Bill—Boundaries of Burghs Extension (Scotland) Act Amendment.
Statistical Abstract for the United Kingdom from 1846 to 1860.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, May 71th*, 1861.]

Dated 2nd May, 1861.

1095. J. C. Wilson, 25, Bucklersbury—Imp. in machinery or apparatus for the manufacture of sugar.
1096. W. Scoles, High-town, near Leeds—Imp. in carding engines for carding wool, cotton, silk, or other fibrous substances.
1097. W. Hoyle, Greenhill-terrace, Greenhill, Oldham—Certain imp. in machinery for preparing, spinning, and doubling cotton and other fibrous substances.
1098. M. Winkler, 683, Gumpendorf, Vienna, Austria—Certain imp. in locks and other fastenings.
1099. E. de Bassano and A. Brudenn, Brussels—Imp. in the manufacture of stearine.
1101. W. Clark, 53, Chancery-lane—Imp. in the imitation of gold and silver embroidery. (A com.)
1103. R. A. Brooman, 166, Fleet-street—Imp. in solar timekeepers or chronometers. (A com.)
1104. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in gas burners. (A com.)

1105. J. G. Brown, Croxton, Leicestershire—Imp. in obtaining motive power.
1106. P. Wright, Dudley, Worcestershire—Imp. in the manufacture of wheels, and in apparatus or machinery to be employed therein.
1107. W. Clissold, Dudbridge, Gloucestershire—An improved construction of driving belt.
1108. G. Mead, Bethnal-green-road, Middlesex—An improved portable canteen adapted for use in the army, and for volunteers, tourists, and others.

Dated 3rd May, 1861.

1109. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—The manufacture of paper and card-board from a fibrous vegetable matter not hitherto used for that purpose. (A com.)
1111. T. Bradshaw, Salford—Certain imp. in machinery or apparatus for doubling yarn or thread.
1112. G. Hayes, Elton, Huntingdonshire—Improved apparatus for applying motive power.
1113. O. Rowland, Wellington-road, Kentish-town—Imp. in electric telegraphs
1115. J. A. Manning, Inner Temple, London—A mode or method of collecting ammonia from the waste gases arising from the combustion of coal.
1116. A. Wight, Friday-street, Cheapside—Imp. in the manufacture of trimmings. (A com.)
1117. W. E. Newton, 66, Chancery-lane—Imp. in the treatment of copper ores. (A com.)
1118. E. Humphrys, Deptford, Kent—Imp. in machinery for steam vessels.

Dated 4th May, 1861.

1119. J. Johnson, 61, Leader-street, Chelsea—Improved show or window boards or tablets to be used for advertising and other purposes.
1120. W. Addy, Pigot-street, Manchester—Imp. in machinery for washing fabrics and for churning.
1121. G. Rydill, Dewsbury, Yorkshire—A smoke consumer and condensor suitable for factories, railway engines, steam ships, furnaces, brick kilns, cinder ovens, bakehouses, and other purposes.
1122. G. W. Reynolds, Birmingham, and S. G. Taylor, Oldbury, Worcestershire—A new or improved hand drill for drilling wood, metal, and other materials. (A com.)
1123. W. Rowan, Belfast—Imp. in machinery for scutching flax and other fibrous substances, applicable also for reducing flax, hemp, and other fibrous materials into tow.
1124. R. A. Brooman, 166, Fleet-street—An improved thread for weaving and other uses. (A com.)
1125. W. C. Homersham, Adelphi-terrace, Middlesex—Imp in engines and implements for ploughing and cultivating land, parts of which imps. are also applicable to other purposes.
1126. W. Palmer, 3, Evelyn-place, Brighton—Imp. in apparatus for facilitating the imbibing of liquids.
1127. J. M. Baab and F. O. Thomas, Gerrard-street, Soho—Imp. in apparatus for perforating paper, parchment, and other substances.
1128. E. P. Smith, Weymouth—Imp. in the manufacture of radial traversing carriages.
1129. E. B. Wilson, Great Ryder-street, Saint James', Westminster, and W. Tijou, Newland-street, Eaton-square, Middlesex—Imp. in the manufacture of railway wheels, tyres, and other annular, cylindrical, and hollow articles from cast steel or malleable cast iron, and in the machinery or apparatus employed therein.
1130. W. Birks, sen., W. Birks, jun., and J. Birks—Imp. in the manufacture of lace or net, and in the machinery employed therein.

Dated 6th May, 1861.

1131. J. V. Vignon, 34, Dean-street, Soho-square, Middlesex—A mode of preparing or making enamel applicable to various purposes.
1133. J. C. Tiffany, New York—A mode of promoting a more perfect combustion of fuel in furnaces, and in the manner of effecting the same.
1134. T. Blackburn and M. Knowles, Blackburn—Imp. in machinery or apparatus for warping cotton, worsted, and other similar materials, and in expanding combs used in connection therewith, and also in springs used in the manufacture of the said combs, which springs are applicable to other purposes.
1135. E. T. Hughes, 123, Chancery-lane—Imp in the manufacture of artificial flowers and similar articles. (A com.)
1137. W. Abbott, Richmond, Surrey—Imp. in the construction of cages for singing and other birds or animals.
1138. W. Johnson, Little Malvern, Worcestershire—Imp. in railway carriages and locomotive engines.
1139. W. Johnson, Little Malvern, Worcestershire—Imp. in apparatus for churning and kneading.
1141. R. A. Brooman, 166, Fleet-street—The manufacture of threads, cords, fabrics, felt, and pulp from the hop plant. (A com.)
1144. W. E. Newton, 66, Chancery-lane—An improved lubricating compound (A com.)
1145. J. Burch, Cragg-hall, near Macclesfield—Imp. in the construction of steam and other boilers, and apparatus connected therewith.

Dated 7th May, 1861.

1146. C. Stevens, 31, Charing-cross—Imp. in gutta-percha and india-rubber toys. (A com.)
1148. S. A. Beers, Brooklyn, New York—Imp. in rails for street railways.
1149. J. B. Jarlot, 4, South-street, Finsbury—Certain imp. in machinery for the manufacture of artificial fuel.
1151. F. Defaye, Capian, near Bordeaux, France—Improved hydraulic apparatus.
1152. W. E. Gedge, 11, Wellington-street, Strand—Improved means and apparatus for conducting or forcing the flow of water. (A com.)
1153. J. Willis, Little Britain, London—Imp. in umbrellas and parasols.
1155. G. Davies, 1, Serle-street, Lincoln's-inn—Improved apparatus for boiling sugar. (A com.)
1156. W. Birks, sen., W. Birks, jun., and J. Birks, Nottingham—Imp. in the manufacture of bobbin net or lace.

Dated 8th May, 1861.

1160. J. Nadal, 14, Brooke's Market, Brook-street, Holborn—Improved candlesticks.
1162. H. M. Nicholls, 9, Essex-street, Strand—An improved instrument for withdrawing corks from bottles when acting as stoppers therein.
1166. J. R. Hunt, 3, Chichester-place, Wandsworth-road, Surrey—Imp. in the manufacture of gutta percha and compounds thereof with other matters and substances.
1168. E. Hoskins, Birmingham—An imp. in joints for articles in metal.

[*From Gazette, May 24th*, 1861.]

Dated 1st March, 1861.

523. F. Tolhausen, 35, Boulevard Bonne Nouvelle, Paris—A new or improved machine for gathering and binding the sheaves or gavels of corn or other harvest produce, applicable to harvesting machines. (A com.)

Dated 9th April, 1861.

873. A. Tweedale, South-cottage, Healey, near Rochdale, J. Tweedale, Healey-hall, and S. Tweedale, Rochdale, Lancashire—Imp. in temples for looms.

Dated 25th April, 1861.

1032. G. Bartholomew and W. Bissett, Hoxton-square—Imp. in portable fountains.

Dated 1st May, 1861.

1083. J. Sickles, 67, Gracechurch-street—Imp. in sewing machines. (A com.)

Dated 3rd May, 1861.

1110. A. F. Rhind, Norfolk-place, Lower-road, Islington—Imp. in the fastenings of brooches, pins, and other articles of jewellery, which fastenings are also applicable to other articles.

Dated 6th May, 1861.

1140. G. H. Ellis, New Malton, Yorkshire—Imp. in apparatus for cleaning boots and shoes, which are also applicable for cleaning knives, forks, plate, and other articles.
1142. J. Drew, Hatton-garden—Improved apparatuses to be employed for supporting structures, while inserting girders therein.

Dated 8th May, 1861.

1157. J. Pickett, Chiswell-street, Finsbury—Imp. in covering or partially covering the sticks and handles of whips and parasols, as also various other articles, with flock, and producing ornamental effects thereon.
1159. T. Elce, jun., Manchester—Certain imp. in machinery for combing wool, cotton, and other fibres.
1161. J. T. Massiaux, Nouzon, France—Imp. in the manufacture of nails, and in apparatus used thereby.
1163. R. Bernard, Bordeaux—Improved means of catching flies.
1165. J. Fitter, Birmingham—A new or improved table expander.
1167. W. W. Harrison, Sheffield—Imp. in tea and coffee-urns, coffee-pots, and other vessels for similar purposes.
1169. P. H. Williams, Bristol—Imp. in the adaptation of plates of iron and other metal in the construction of dwelling houses, fences, parts of carriages or vehicles, and in other structures or constructions.
1170. H. Swan, Hammersmith—Imp. in lubricating apparatus for lubricating the journals and bearings of shafts and other frictional surfaces of machinery.

Dated 9th May, 1861.

1171. J. Yeadon, Lancashire-hill, near Stockport—Imp. in the manufacture of healds.
1172. C. Lenny, Croydon—Imp. in carriages.
1173. G. Carter, Blackburn—An improved thermometrical fire alarum and extinguisher.
1174. J. Stewart, Glasgow—Imp. in the manufacture of cards for jacquard weaving. (A com.)
1175. J. Burch, Cragg-hall, near Macclesfield—Imp. in constructing and in machinery or apparatus for propelling ships and vessels.
1176. F. Stern, 75, Cannon-street West—Imp. in fastenings for portemonnaies, pocket-books, cigar cases, and similar articles. (A com.)
1177. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the decoloration and disinfection of liquids, and in the apparatus to be employed therein, which imps. are also applicable to the manufacture or production of drying oils. (A com.)
1178. H. Cater, Southwark—Imp. in the construction of steam boilers.

1179. I. M. Singer, New York—An improved feed motion for sewing machines.
1180. H. Allen, Birmingham—An imp. or imps. in and applicable to gloves.
1181. J. Browning, Minories, and W. Crookes, Mornington-road, Middlesex—Imp. in spectrum cameras.
1182. J. Paterson, Wood-street—An imp. in neck-ties.

Dated 10th May, 1861.

1184. W. Parsons, 28, Scotland-street, Brighton, J. Dowling, Gloucester-lane, Brighton, and J. Dowling, jun., Gloucester-cottages, Brighton—Imp. in railway and other passengers' tickets.
1185. T. L. Jackson, Mile End, Middlesex—Imp. in furnace bars.
1186. L. W. Roddewig, Sheffield—Imp. in steam boilers. (A com.)
1187. A. Dunlop, Glasgow—Imp. in endless or portable railways for facilitating the traction or draught of vehicles.
1189. S. Barrett, Clifton-street, Middlesex—Imp. in projectiles.
1190. Major J. F. L. Baddeley, R.A., Enfield—Imp. in bands for rifles and other fire arms.
1191. P. Vallance, 4, Bolton-road, Abbey-road, St. John's-wood—Imp. in fire arms and ordnance.

Dated 11th May, 1861.

1193. D. Zenner, Newcastle upon-Tyne—Imp. in purifying lead.
1195. J. Wareing, Salford—Imp. applicable to Ryder's forging machine, which render it better adapted for forging mule spindles and articles of a similar form.
1197. W. Wilson, Conisbro', Yorkshire—Imp. in the manufacture of wooden keys and treenails for railways and shipping, and in machinery employed therein.
1198. C. W. Lancaster, New Bond street—Imp. in armour plates and bars for protecting ships and other structures, and in fixing the same.
1199. R. A. Brooman, 166, Fleet-street—An improved method of treating wood. (A com.)
1200. A. C. A. G. de Melcy, Paris—An improved treatment of natural phosphate of lime for several purposes.
1203. H. Swindells, Handforth, Cheshire—Imp. in collars for horses.
1205. W. Clark, 53, Chancery-lane—Imp. in the construction, ventilation, and propulsion of life boats. (A com.)
1206. W. Clark, 53, Chancery-lane—Certain imp. in machinery for planing lumber. (A com.)

Dated 13th May, 1861.

1207. F. Puls, 25, Francis terrace, Hackney Wick—A mode of preparing an oxidizing agent.
1208. R. Heaton and J. Stocks, Silsden, near Leeds—Imp. in looms for weaving.
1209. J. Bermingham, Cork—Imp. in machinery or apparatus for breaking stones and other hard materials.
1210. P. Chardemitte, 4, South-street, Finsbury—An improved wind motive power engine.
1211. W. Clark, 53, Chancery-lane—Imp. in corking or stoppering bottles. (A com.)
1212. G. Betjemann, G. W. Betjemann, and J. Betjemann, Pentonville—An imp in inkstands or ink holders.
1213. J. Deakin, Harborne, Staffordshire—Imp. in and applicable to the manufacture of slabs, panels, and other forms or articles in paper or paper pulp.
1214. T. Bell, Usworth-house, Gateshead—Imp. in the decomposition of the compounds of aluminium and in coating metals with aluminium or its alloys. (A com.)
1215. C. F. Pollard, 26, Brompton-crescent—A sandal slipper particularly adapted for use in Turkish and other baths.
1217. W. Clark, 53, Chancery-lane—The treatment of ammoniacal waters resulting from putrified urines, and from products extracted by the distillation of coal. (A com.)
1220. C. Oliver, Old Boswell-court, Middlesex—Imp. in apparatus for sounding bells on lighthouses, floating lights, buoys, and like floating bodies
1221. R. Hornsby, jun., Spittlegate, Lincolnshire—Imp. in ploughs and other agricultural implements.

Dated 14th May, 1861.

1222. A. F. Hildebrand, Kopnicker Strasse, No. 101, Berlin—Imp. in apparatus for propelling and steering carriages, which apparatus is also applicable for giving motion to machinery generally.
1223. W. Clark, 53, Chancery-lane—Imp. in the manufacture of steel. (A com.)
1225. J. Bullough and J. Bullough, Baxenden, near Accrington, Lancashire—Imps. in looms for weaving, and in apparatus connected therewith.
1227. F. Bull, 138, London-wall—Imp. in show cases and boxes used in counting houses and by shopkeepers for containing different kinds of wares and papers or samples.
1228. R. A. Brooman, 166, Fleet-street—Imp. in working sugar refineries, and in sugar moulds and apparatus for trimming the loaves therein. (A com.)

Patents Sealed.

[*From Gazette, May 24th*, 1861.]

May 22nd.

2866. J. Venables.
2883. R. Harrison and G. Taylor.
2888. P. Dorgeval.
2889. J. Fowler, jun., R. Burton, and D. Greig.
2892. J. W. Hadwen.
2893. W. Pearson, W. Spurr, and T. Smith.
2894. G. F. Train.
2895. G. F. Train.
2899. S. Roberts.
2900. G. Mackenzie and J. Hamilton.
2904. I. Sharp and W. Bulmer.
2908. W. S. Wood.
2916. J. Robb.
2925. T. Holmes.
2939. E. C. Perry.
2942. C. Stevens.
2948. C. Farmer and W. Farmer.
2979. J. B. Payne.
3141. T. Hunt.
154. D. Mann.
556. E. Whittaker and J. Clare.
689. J. A. Bolton.
751. J. Spencer, jun., and M. Spencer.

May 24th.

2911. J. Fowler.
2913. F. S. Beatty and T. Alexander.
2915. J. B. Lecomte-Alliot.
2921. H. Grafton.
2927. J. Jeyes.
2941. E. T. Hughes.
2944. R. C. Newbury.
2997. P. Guerin.
3000. S. Holman.
3099. M. Henry.
185. M. Henry.

[*From Gazette, May 28th*, 1861.]

May 28th.

2930. H. Hirsch.
2936. T. Cole and D. Gardner.
2940. G. Parsons.
2943. J. Pelegrin.
2947. A. Jackson.
2949. W. S. Losh.
2950. W. L. Tizard.
2952. J. Ronald.
2953. J. Austin.
2954. T. Shedden.
2956. A. Leonhart.
2957. W. P. Piggott.
2960. W. Galloway and J. Galloway.
2961. T. Richardson.
2964. J. Lowden and R. Buckley.
2977. G. F. Stidolph, T. Simpson J. R. Morley, & J. Stidolph
2984. G. Hallett.
2985. E. Morewood.
2988. C. J. Duméry.
2989. H. Jordan.
2994. J. Bellamy.
3002. W. Clark.
3006. W. Morris and J. Radford.
3019. W. E. Newton.
3025. J. Young and C. Cairns.
3140. J. Rigby and J. Needham.
3165. J. H. Johnson.
53. W. Taylor.
291. R. Howarth.
672. J. Robb.
858. H. Wilde.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, May 24th*, 1861.]

May 20th.

1126. H. Brierly.

May 22nd.

1196. C. Clarke.

[*From Gazette, May 28th*, 1861.]

May 23rd.

1155. R. L. Hattersley.
1172. W. E. Newton.

May 24th.

1168. P. Griffiths.
1179. J. Luis.
1188. F. Bouquié.
1193. C. Cowper.
1238. D. Service.

May 25th.

1186. S. C. Lister and J. Warburton.
1187. J. Stuart.
1207. E. Bond.
1239. C. Wheatstone.
1241. C. Wheatstone.
1297. F. A. Gatty.
1319. J. S. Crosland.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, May 24th*, 1861.]

May 22nd.

1140. R. Oram and W. Oram.
1160. T. Ball.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietors' Name.	Address.
4365	May 3.	Safe and Refrigerator combined	James Walker and Andrew Langman	6, Park-place, Bayswater, W. 11A, Farm-street, Notting-hill, W.
4366	,, 4.	Improved Water Filter	William Elliott and Wm. Firth	Manchester.
4367	,, 7.	Fastenings for Buttons, Brooches, and Scarf Ornaments	John Newton and Stephen Gamman	Nottingham, Westminster, Executors of the late Thos Acott, of Birmingham.
4368	,, 10.	Rifle Groove	James Kerr	Bermondsey, S.E.
4369	,, 13.	Improved Bag Fastening	Christian Weinrand	Offenbach-on-the-Maine.
4370	,, 13.	Ammunition Pouch	James Kerr	Bermondsey, S.E.
4371	,, 18.	A Washer to be used with the fastenings by which loose ornamental parts or terminations are secured to Tea pots, Coffee-pots, and other vessels and articles	Philip Ashberry and Sons	Sheffield.
4372	,, 22.	Tap or Cock for drawing-off liquids	Edwin Barber	Birmingham.

Journal of the Society of Arts.

FRIDAY, JUNE 7, 1861.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £414,600, have been attached to the Deed.

GUARANTEE FUND FOR THE EXHIBITION OF 1862.

The following additions have been made since the last announcement, in the *Journal* for May 31:—

*** *The names marked with an asterisk are those of Members of the Society of Arts.*

NAMES.	AMOUNT.	REPRESENTING THE OBJECTS OF THE SOCIETY—ARTS, MANUFACTURES, AND COMMERCE.
Francis Edward Morrish, Lancaster-buildings, Liverpool	100	
The Duke of Devonshire, Devonshire House, Piccadilly, W.	2,000	
*Joseph Staples, 10, South-street, Brompton, S.W.	200	
Henry Miles, The Downfield, Kington, Herefordshire	500	
Frederick Chapple, Hayton Hall, near Prescot	500	
*Petter and Galpin, La Belle Sauvage-yard, E.C.	250	
Samuel Higgs, Mayor of Sudbury	100	

By Order,

P. LE NEVE FOSTER, *Secretary.*

INTERNATIONAL EXHIBITION OF 1862.

The following letter has been addressed to Lord Granville by Prince Napoleon, President of the Imperial Commission appointed to represent the interests of intending Exhibitors:—

(Copy.)

Paris, le 1er Juin, 1861.

Milord,—J'ai le plaisir de vous annoncer que S. M. l'Empereur, désirant concourir au succès de l'Exposition universelle de 1862, a bien voulu, par décrets des 14 et 18 Mai derniers, instituer, sous ma présidence, une Commission, chargée d'organiser la Section Française de cette Exposition, et de se concerter, à cet effet, avec la Commission Royale que vous présidez. Je m'empresse d'ajouter que mes collégues et moi nous sommes heureux d'entrer en relation avec la Commission Royale, et que nous lui apporterons dans cette œuvre d'utilité générale un concours dévoué.

Je profite, Milord, de cette première communication pour vous exprimer quelques vœux dont la réalisation hâterait l'accomplissement de notre tâche.

Le délai compris entre l'institution de la Commission dirigeante et l'ouverture de l'Exposition de 1862, étant moindre qu'il ne l'a été en 1851 et en 1855, il importe que la Commission Royale nous donne sans retard communication des actes, avis, et circulaires qui émaneront d'elle, et qui peut nous être utile de connaître.

Ainsi il nous serait particulièrement utile d'être éclairés sur le régime que la Commission Royale se propose d'adopter au sujet des récompenses, de savoir si ces récompenses auront un caractére international, ou si chaque nation y pourvoira selon ses propres convenances.

Nos travaux se trouvent tout d'abord entravés par l'incertitude où nous restons, jusqu'à présent, en ce qui concerne la situation, la forme, et l'étendue des emplacements qui seront attribués à nos nationaux pour l'exposition des produits de l'agriculture et de l'industrie, des machines en mouvement, et des œuvres d'art. Il serait particulièrement opportun que la Commission Royale nous adressât immédiatement le plan d'ensemble des locaux de l'Exposition universelle, avec mention spéciale des emplacements attribués à la France. Tant que ce document nous fera défaut, il nous sera impossible de prendre aucun engagement avec les personnes dont nous cherchons à stimuler le zèle, et, si cette incertitude se prolongerait, il serait à craindre que le succès de l'exposition ne fût définitivement compromis.

Je vous adresse ampliation des deux décrets qui constituent la Commission Impériale, et je me ferai un plaisir de vous donner ultérieurement, si la Commission Royale en exprime le désir, communications des faits qui pourront signaler le progrès de nos efforts.

Je dois enfin vous informer, Milord, que M. Rouher, Ministre de l'Agriculture, du Commerce, et des Travaux Publics, est nommé Vice-Président de la Commission Impériale, et que M. F. Le Play, Conseiller d'Etat, Secrétaire-Général de la Commission, est autorisé a correspondre, par délégation du Président, avec la Commission Royale.

Veuillez, &c.,
Le Président de la Commission,
(Signed) NAPOLEON (JEROME).

A Son Excellence, Monsieur le Comte Granville,
Lord Président du Conseil.

Translation.

Paris, 1st June, 1861.

My Lord,—I have the pleasure of informing you that

His Majesty, the Emperor, being desirous of contributing to the success of the Universal Exhibition of 1862, has, by decrees of the 14th and 18th May, been pleased to appoint a Commission, of which I am President, to organize the French section thereof, and to place itself, for this purpose, in correspondence with the Royal Commission over which you preside. I am anxious to add, on the part of my colleagues and on my own, that we consider ourselves fortunate in being thus associated with the Royal Commissioners, and that we will render them hearty assistance in this work of general utility.

I avail myself, my Lord, of this first communication to express to you my desire to be supplied with information on certain points, the knowledge of which would materially assist us in the fulfilment of our task.

The time intervening between the appointment of the Superintending Commission and the opening of the Exhibition of 1862, being less than in 1851 and 1855, it is of importance that Her Majesty's Commissioners should communicate to us without delay all decisions, &c., proceeding from them, the knowledge of which can be of any use to us.

For instance, it would be especially useful to us to be informed of the regulations that Her Majesty's Commissioners propose to adopt in regard to prizes; whether these will bear an international character, or whether each nation will make its own arrangements in the granting of them.

Our labours are impeded at the outset by the uncertainty in which we are at present placed concerning the position, the nature, and the amount of space that will be allotted to our countrymen for the exhibition of agricultural and industrial produce, of machinery in motion, and works of art; and it would be extremely convenient if her Majesty's Commissioners would take the earliest opportunity of transmitting us a general plan of the Exhibition buildings, showing the space allotted to France.

Until we are furnished with this document, it will be impossible for us to enter into any arrangement with those persons whose zeal we desire to stimulate; and if this uncertainty be prolonged, there is reason to fear that the success of the Exhibition may be sensibly affected.

I transmit you copies of two decrees appointing the Imperial Commission, and I shall have great pleasure in communicating to her Majesty's Commissioners, should they desire it, further information as to the progress of our labours.

I have, my Lord, in conclusion, to acquaint you that M. Rouher, Minister of Agriculture, Commerce, and Public Works, is appointed Vice-President of the Imperial Commission, and that by delegation of the President, M. F. Le Play, Councillor of State and Secretary-General of the Commission, is appointed to correspond with her Majesty's Commissioners.

I have, &c.
(Signed) NAPOLEON (JEROME).

CONVERSAZIONE.

The Second Conversazione of this Session took place at the South Kensington Museum, on Saturday evening last, the 1st inst.

The company were received by Sir Thomas Phillips, F.G.S., Chairman, and the Members of the Council.

The Bands of the Royal Horse Guards (Blue) and of the 1st Middlesex Engineer Volunteers, were in attendance.

The number of Members and their friends present was 3,550.

TENTH ANNUAL CONFERENCE.—NOTICE TO INSTITUTIONS.

The Tenth Annual Conference between the Representatives of the Institutions in Union and the Council will be held on Tuesday, the 18th inst., at half-past 10 o'clock in the morning. Sir Thomas Phillips, Chairman of the Council, will preside.

Secretaries of Institutions in Union are requested to forward, as soon as possible, to the Secretary of the Society of Arts, the names of the Representatives appointed to attend the Conference, stating at the same time (if possible) whether those gentlemen will also be present at the Society's Annual Dinner, which will take place on the following day, and of which particulars are given below.

The Chairmen of, or Representatives from, the several Local Boards of Examiners are invited to attend.

The Council will lay before the Conference:—

1. The Secretary's Report of the proceedings of the Union for the past year.

2. The Programme of the Examinations for 1862.

3. The Minutes of the Meeting which, at the suggestion of the Southern Counties Education Society was held here, to establish the "Central Committee of Educational Unions, in connexion with the Society of Arts." [See *Journals* of February 22nd and April 12th.]

> *** The objects of that Committee are to promote a uniformity of standard in the Local Elementary Examinations, and to give a settled uniform value to the Local Certificates. The Council will be glad to ascertain, from the Representatives of Institutions and of the Local Boards, whether, in their opinion, those bodies are likely to be benefited by the action of the Central Committee.

4. In connexion with this subject, the Conference will be invited to consider whether it is desirable to pass any resolutions suggesting the further grouping of neighbouring Institutions in County or District Sub-Unions.

5. The Council will communicate to the Conference the Resolutions passed on the 6th of February, and published in the *Journal* of the 15th of that month, in favour of the establishment of District Museums, and the systematic circulation of interesting objects for temporary exhibition therein.

6. The Council will call attention to its recent communications with the Company of Painters' Stainers, [see *Journal* of 26th April], and will invite the Conference to consider whether any Resolutions should be passed in favour of Competitive Exhibitions of Works of Skilled Labour.

7. The Conference will be asked to consider whether arrangements should be made to enable Excursion Parties of Institutions in Union with the Society of Arts to assemble in a great gathering at the Crystal Palace, on Monday, the 26th, or Tuesday, the 27th of August, or on some other day.

8. The adjourned question, whether the Institutions can advantageously make arrangements for their members to visit the International Exhibition of 1862, will be brought forward.

9. At the last Conference it was agreed that the subject of Mr. Buckmaster's motion (of 1859), respecting the exclusion of Institutions from the Parliamentary Grants for Education, should be further discussed at the ensuing Conference.

10. The Representatives will be asked whether they

desire that the Society should print and issue to the Institutions another edition of the List of Lecturers.

Notice of any other subjects which Representatives may wish to submit to the Conference, should be given to the Secretary of the Society of Arts.

ANNUAL DINNER.

The One Hundred and Seventh Anniversary Dinner of the Society will take place at the Crystal Palace, Sydenham, on Wednesday, the 19th inst., at 5 o'clock, punctually. The Right Hon. the Earl of Elgin and Kincardine, K.T., G.C.B., will preside.

The Members and their friends will assemble in the ante-room of the Dining Hall, in the Railway-wing, at half-past four o'clock. Application for Tickets (price 10s. 6d. each) should be made to Mr. Samuel Thomas Davenport, at the Society's House. It is particularly requested that those who intend to be present will take their tickets as soon as possible in order to facilitate the arrangements.

EXAMINATIONS, 1861.

The following Prizes have been awarded to Institutions and Local Boards, in accordance with the conditions* set forth in the Examination Programme for this year:—

PRIZES TO INSTITUTIONS.

One Prize of £5 to the Metropolitan Evening Classes, Sussex Hall, in respect of Candidate No. 444, Thomas Smith, who obtained the First Prize in Book-keeping.

One Prize of £5 to the Leeds Young Men's Christian Association, in respect of Candidate No. 186, T. Myers, who obtained the First Prize in Algebra.

One Prize of £5 to the Metropolitan Evening Classes, Sussex Hall, in respect of Candidate No. 450, William Vaughan, who obtained the First Prize in Geometry.

One Prize of £5 to the Leeds Young Men's Christian Association, in respect of Candidate No. 193, Thomas Hick, who obtained the First Prize in Mensuration.

One Prize of £5 to the Glasgow Mechanics' Institution, in respect of Candidate No. 354, John Crum, who obtained the First Prize in Magnetism, Electricity, and Heat.

One Prize of £5 to the Glasgow Athenæum, in respect of Candidate No. 567, John Allan, who obtained the First Prize in Logic and Mental Science.

One Prize of £5 to the Glasgow Institution, in respect of Candidate No. 828, William Craig, who obtained the First Prize in Latin and Roman History.

One Prize of £5 to the London Mechanics' Institution, in respect of Candidate No. 36, George Legg, who obtained the First Prize in French.

One Prize of £5 to the Metropolitan Evening Classes, Sussex Hall, in respect of Candidate No. 452, George Warington, who obtained the First Prize in German.

One Prize of £5 to the Glasgow Mechanics' Institution, in respect of Candidate No. 328, James Wade, who obtained the First Prize in Music.

No Prizes are awarded to Institutions in respect of the Candidates who obtained First Prizes in Arithmetic, Trigonometry, Conic Sections, Navigation and Nautical Astronomy, Chemistry, Animal Physiology, Botany, Mining and Metallurgy, Geography, English History, and English Literature, it having been ascertained that these Candidates had not received "systematic instruction" in these subjects at their respective Institutions "for a period of not less than three months," as required by the conditions.

PRIZES TO LOCAL BOARDS.

The Prize of £10 to the Local Board at the Glasgow Institution.

The Prize of £8 to the Local Board at the Glasgow Athenæum.

The Prize of £6 to the Local Board at the London Mechanics' Institution.

The Prize of £4 to the Local Board at the Halifax Mechanics' Institution.

The Second Prize of £3, in Geography, has been awarded to No. 386, John Grieveson, aged 28, Darlington Church of England Institution—Railway Agent.

FEMALE SCHOOL OF ART.

An Exhibition of Water Colour Paintings, illustrative of the history of the art, is now open at the House of the Society of Arts. This Exhibition has been organised for the purpose of aiding the building fund of the Female School of Art. This school has met with unforeseen difficulties. It was established and for a time supported by governmental aid, and then that aid was suddenly withdrawn. The school, originally the female "School of Design," was established by Government at Somerset House, in 1842, but from want of accommodation it was removed to adjacent premises in the Strand, and for a

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* The conditions were as follows:—

"The following Prizes are offered to the Institutions, viz.:—To the Institution whose Candidate obtains the above-mentioned First Prize of £5 in any of the 29 Subjects, one Prize of £5. An Institution can take more than one such Prize; but no such Prize can be taken by an Institution unless the Council of the Society of Arts is satisfied that the Candidate, in respect of whom the Prize is claimed, has received in a class at the Institution systematic instruction in the subject for a period of not less than three months.

"The following Prizes are offered to the Local Boards, viz:—To the Local Board where the total number of Certificates awarded to the Candidates at the Final Examination (these Candidates being not fewer than twenty), bears the largest proportion (not less than three-fourths) to the total number of subjects in which they were examined;—One Prize of £10. To the Local Board where the total number of Certificates awarded to the Candidates at the Final Examination (these Candidates being not fewer than sixteen), bears the largest proportion (not less than three-fourths) to the total number of subjects in which they were examined;—One Prize of £8. To the Local Board where the total number of Certificates awarded to the Candidates at the Final Examination (these Candidates being not fewer than twelve), bears the largest proportion (not less than three-fourths) to the total number of subjects in which they were examined;—One Prize of £6. To the Local Board where the total number of Certificates awarded to the Candidates at the Final Examination (these Candidates being not fewer than eight), bears the largest proportion (not less than three-fourths) to the total number of subjects in which they were examined;—One Prize of £4. No Local Board can receive more than one of these Prizes. These sums may be applied by the Local Boards to the payment of the expense of the Examination, or otherwise, as the Board may deem best for the promotion of the objects for which it was instituted. No Prize of any kind can be awarded to, or in respect of, any certificated teacher, any pupil teacher, or any person belonging to a higher grade of Society than those referred to in Paragraph I. of the Preliminary Notice."

similar reason transferred to Gower-street in 1852. In the report it is stated that "since 1852 six hundred and ninety students have entered themselves at the school, and the number at the present time is 118, of whom 77 are studying with the view of ultimately maintaining themselves. Some of them daughters of clergymen and medical men, unexpectedly compelled by a variety of causes to gain their own livelihood, and even to support others besides themselves, have, through the instruction and assistance received here, obtained good appointments in schools, or are enabled to live independently by means of private teaching. The present daily attendance averages seventy." Precisely at the time when the school seems to have struck root and to be steadily widening its area of usefulness, the Committee of Council on Education have intimated their intention of withdrawing their special assistance from the school (amounting to £500 per annum.), and of finally closing it, unless it can be placed on a self-supporting basis. Now, the success of the school proves that it is of sufficient value to deserve an effort to maintain its existenee. The works of the female students here exhibited with the historical collection, and for which medals and prizes were distributed by the President of the Committee of Council on Education, Earl Granville, in the lecture theatre of the Museum of Geology, Jermyn-street, on Saturday, are in many ways encouraging. It appeared advisable, therefore to make an effort to purchase premises as a home for the school, and thus give it a fair chance of becoming self-supporting. For this purpose it was calculated that at least £2,000 would be required. An appeal to the public has already brought in subscriptions to the amount of £1,191; the present exhibition will increase this amount, and a bazaar will be held in June for the same object. It is further understood that the Science and Art Department is prepared to apply to Parliament for a grant of 25 per cent. on the cost of erecting the building. There is, therefore, the fairest prospect that a female school of art will be added to the few resources open to respectable but unsupported women of obtaining an honourable livelihood; and such a plan deserves every success.

Visitors are admitted to this exhibition on payment of one shilling.

TWENTY-FOURTH ORDINARY MEETING.

Wednesday, June 5, 1861.

The Twenty-fourth Ordinary Meeting of the One Hundred and Seventh Session was held on Wednesday, the 5th inst., His Royal Highness the Prince Consort, President of the Society, in the chair.

The following gentlemen were proposed for election as members of the Society:—

Addington, Right Hon. Henry Unwin	78, Eaton-place, S.W.
Andrew, Charles William	6, Spencer-place, Brixton-road S.
Andrews, Samuel	21, John-street, Adelphi, W.C.
Angell, Joseph	10, Strand, W.C.
Asprey, Charles	166, New Bond-street, W., and 22, Albemarle-street, W.
Baume, Celestin	21, Hatton-garden, E.C.; and 15, Canterbury-road, East Brixton, S.
Berri, David Gardner	96, Great Russell-street, Bloomsbury, W.C.
Beveridge, Erskine	Priory House, Dunfermline, N.B.
Biddle, Daniel	81, Oxford-street, W.
Black, J. R., M.D.	23, Sumner-place, Onslow-square, S.W.
Blackwell, Thomas F.	21, Soho-square, W.
Browning, John	111, Minories, E.
Byas, Edward	20, Princes-square, Bayswater, W.
Cock, John, jun.	Southmolton, Devon.
Coghlan, H.	14, Hyde-park-gardens, W.
Cole, Thomas	6, Castle-street, Holborn, E.C.
Collins, William Job, M.D.	1, Albert-terrace, Primrose-hill, N.W.
Cooke, William	26, Spring-gardens, S.W.
Christy, Henry	103, Victoria-street, Westminster, S.W.
Davis, Frederick	100, New Bond-street, W.
Evans, John Llewellyn	120, Westbourne-terrace, W.
Fairbairn, Andrew	Wellington Foundry, Leeds.
Fisher, Samuel	33, Southampton-street, Strand, W.C.
Foote, Harry Wells	75, Old Broad-street, E.C.
Galpin, Thomas Dixon	Datchet Lodge, Datchet.
Gibbs, John	122, High-street, Oxford.
Gooden, James Chisholm	33, Tavistock-square, W.C.
Goore, Wm. Henry P.	Camden-villa, Moscow-road, Kensington Palace-gardens, W.
Grabham, Charles	18, Cannon-street, E.C.
Great-Rex, Augustus	23, Holborn-hill, E.C.
Hannay, Thomas	7, Terrace, Liskeard, Cornwall.
Hawkins, George	88, Bishopsgate-street Without, E.C.
Hemming, Frederick H.	104, Gloucester-place, Portman-square, W.
Henderson, George Wm. Mercer	103, Eaton-place, S.W.
Hewett, William	18, Fenchurch-street, E.C.
Hopcraft, George	3, Billiter-square, E.C.
Johnson, F.	12, North-street, Westminster, S.W.
Knill, Stuart	The Crosslets-in-the-grove, Blackheath, S.E.
Ledger, Robt. Goulding	St. John's, Southwark, S.E.
Leigh, Evan	Newton-grange, Newton Heath, near Manchester.
Leigh, Frederick Allen.	Eccles, near Manchester.
Leonard, Thomas	Tabernacle-walk, Finsbury, E.C.
Leuchars, William	38, Piccadilly, W.
Lewis, James	Bartlett's-buildings, Holborn, E.C.
Lezard, Joseph	21, Hatton-garden, E.C.; and 41, Duncan-terrace, Islington, N.
Line, William	Daventry.
Lucas, Thomas Charles.	Lower Grove House, Roehampton, S.W.
Malcolm, Major-General G. A.	67, Sloane-street, S.W.

Martyn, Silas Edward..	46, Thurloe-square, Brompton, S.W.
Maynard, Joseph	52, Westbourne-terrace, W.
Miles, Alfred W.	11, St. Mary Abbot's-terrace, Kensington, W.
Monk, Frederick W....	Woodland-villas, Gipsey-hill, Upper Norwood, S.
Needham, William ...	Kilmorey House, St. Margaret's, Twickenham, S.W.
Newen, George	1, Hyde-park-terrace, Kensington-gore, W.
Noland, Edward Henry	29, Abingdon-villas, Kensington, W.
Pearce, John	2, Cockspur-street, Charing-cross, S.W.
Petter, George William	7, Upper Hornsey-rise, N.
Phillips, George.........	358 and 359, Oxford-street, W.
Reed, Charles............	Paternoster-row, E.C.
Rintoul, Robert	Wyndham Club, St. James's-square, S.W.
Saul, G. T................	Bow Lodge, Bow, E.
Shove, W. Spencer ...	Lee-terrace, Lee, S.E.
Staples, Joseph	10, South-street, Brompton, S.W.
Staples, Joseph Henry Prosser..................	25, Upper Seymour-street West, Connaught-square, W.
Story, George Marvin..	2, Coleman-street, E.C.
Tayler, George	4, Gower-street, Bedford-square, W.C.
Towle, John	Weirs and Hincksey Mills, near Oxford.
Walker, Joseph W. ...	27, Francis-street, Tottenham Court-road, W.C.
Williams, Charles	223, Oxford-street, W.
Woodall, Frederick ...	25, Orchard-street, Portman-square, W.

The following candidates were balloted for and duly elected members of the Society :—

Adams, George William	Montague-house, Addison-road, Kensington, W.
Balleras, Guillermo Esteban	Seville-villa, Carlton-hill, St. John's-wood, N.W.
Brown, J. W.............	7, Upper Hyde-park-gardens, W.
Christy, Samuel.........	21, St. James's-place, S.W.
Clements, W.............	Cream-hall, Highbury-vale, N.
Cropsey, J. F.	2, Kensington-gate, Hyde-park South, W.
Crossman, Robert	29, Westbourne-terrace, W.
Edwards, William ...	Denmark hill, S.
Follett, Robert B.	25, Norfolk-crescent, W.
Forrest, John	6, Highbury-crescent West, N.
Gregory, Thomas	212, Regent-street, W.
Hannay, Robert, jun....	Springfield, Ulverston.
Hare, Sir John, F.G.S.	Clifton, Bristol; and Chateau d'Hardelot, près Samer, Boulogne.
Hurlstone, F. Y.........	9, Chester-street, Belgrave-square, S.W.
Jodrell, the Rev. Sir Edward Repps, Bart., M.A.	64, Portland-place, W.; Sale-park; and Saxlingham Rectory, Norfolk.
Mocatta, Benjamin......	29, Gloucester-square, Hyde-park, W.
Oxenham, Hugh	353 & 354, Oxford-street, W.
Ryder, William Henry	17, New Bond-street, W.
Simpson, T. A.	154, Regent-street, and 8, Beak-street, W.
Stagg, George	2, Craven-hill-gardens, W.
Stocken, Frederic	5, Halkin-street, Grosvenor-place, S.W.

The Paper read was—

ON THE INTERNATIONAL EXHIBITION OF 1862.

By Mr. William Hawes.

The Council, appreciating the support it has received from the members of the Society in every step it has taken to promote the Exhibition of 1862, resolved to devote the last weekly meeting of the season to the consideration of what has already been done and is doing to ensure the success of this great national undertaking.

But whilst the Council is happy to have an opportunity of laying before the members, the plans of the Royal Commissioners so far as they are known, it must not be considered in the slightest degree responsible for the views and opinions I may express in the paper I have the honour to read.

In order that we may fully appreciate the prospects of the Exhibition of 1862, I will first briefly direct your attention to the origin and progress of the Exhibition of 1851, and then consider whether the advantages derived from it, and the present state of the Arts, Manufactures, and Commerce, as compared with that time, justify the exertions which must be made to form another Exhibition of equal interest and importance.

The idea of holding a National Exhibition, as most of my hearers are aware, originated here. It sprung almost naturally from the proceedings of the Society, for so far back as 1756 it offered prizes for improvements in the manufacture of tapestry, carpets, porcelain, &c.

In 1761, a gentleman was paid to attend an exhibition of machinery in the Society's Rooms, and explain the models exhibited. From an early period, it offered prizes for improvements in agricultural and other machinery.

An Exhibition "of specimens of new, and improved productions of the artizans and manufacturers of the United Kingdom," the first of its kind, was held in the King's Mews, at Charing-cross, in 1828. In 1829, the then Secretary of the Society read papers on several of the leading industries of the kingdom, and from this time specimens of raw materials, manufactures, and new inventions were frequently collected in these rooms for the instruction, and amusement of members and the public.

Then followed local Trade Exhibitions, held at Manchester, Birmingham, Leeds, Dublin, and other places; the Exhibition of manufactures at the Free-Trade Bazaar, held in Covent-garden Theatre, in 1845; the Exhibitions of Select Specimens of British Manufactures and Decorative Arts, held by the Society in 1847, 1848, 1849, the Mulready and Etty Exhibitions in the two latter years; and the Exhibition of Inventions held annually, from that time, in this Society's Rooms, each year proving, by the increased ap-

plications for space, that the resources of the Society of Arts were less and less sufficient to meet the growing interest of the public in such collections.

In France, Exhibitions of national industry had been held at irregular periods between 1789 and 1849, each Exhibition surpassing its predecessor in the number of exhibitors and in the value and importance of the manufactures and machinery exhibited; but the unusual success of that held in 1849, just as this country was sanctioning principles of the most perfect freedom of commercial competition, gave a fresh impetus to the idea of holding a great national Exhibition of British industry, for it was felt to be clearly unwise of our manufacturers to allow their French rivals to attract consumers from all parts of the world, to see and to admire their most beautiful productions, and that no opportunity should be afforded them to become acquainted with the manufactures of England.

The proposition made by this Society to hold an Exhibition of English industry, was, when brought under the notice of our Royal President, soon enlarged into an International Exhibition of the world's industry. Without a clear perception of the progress his adopted country was making, and of the importance of showing it to the world, this comprehensive plan would never have been matured; and the weight of such high authority was necessary to secure an impartial and full consideration of the benefits likely to be derived from the accomplishment of this bold and novel attempt to stimulate our industry by comparing it with that of every other nation.

But, before the plan was fully adopted by the country, at a dinner given at the Mansion House, in October, 1849, by the then Lord Mayor, for the express purpose of promoting an International Exhibition, His Royal Highness, in a speech as remarkable for the simplicity of its language as for the largeness of the views it embodied, placed the subject so ably and so concisely before the world, that no doubt was then entertained that to England would belong the honour of holding the first Exhibition for the purpose of collecting and exhibiting in one building the Works of Industry of all Nations, and which, in the words of His Royal Highness, was—" to give a true test and a living picture " of the point of development at which the whole " of mankind had arrived in this great task, and a " new starting point from which all nations will " be able to direct their further exertions."

That the Exhibition fully realised the most sanguine anticipations in showing the state of development of the Manufactures of all nations up to 1851, and that it gave to the world a more thorough knowledge of the power, and better appreciation of the capabilities, of each nation, is universally admitted, and it now remains for the Exhibition of 1862 to show what has been the world's progress from the starting point so clearly indicated in 1851, not only in the production of works of Art, or in the increased beauty of certain manufactures, but in the practical applications of science, invention, and mechanical skill to improve and to cheapen the necessaries of every-day life, and so to raise the social position, by adding to the comforts and enjoyments, of the great bulk of the people.

In January, 1850, the Royal Commission for holding an International Exhibition was issued, and from that time nothing that could contribute to its success was neglected. To overcome and to dispel the prejudices opposed to it, was a work of no common order, and without a reference to the daily press of the time, it would be difficult to recall to our memory their intensity. The exposure of the finest specimens of our machinery and manufactures to foreigners, for them to imitate, was loudly condemned. The injury sure to follow to our home trade, from the exhibition to our own countrymen of the finest productions of foreign countries, was pressed upon manufacturers. The large number of foreigners expected to come and see the Exhibition was a source of alarm and distrust. Indeed every argument which ignorance, fear, and jealousy could suggest, was freely used to stop the progress of this great and novel movement in the public mind. But the common sense of the country triumphed over such obstacles, and the zeal, energy, and enthusiasm displayed by the few—all members of this Society—who devoted themselves to the task, were soon deservedly rewarded by complete success.

Let us now contrast the state of public feeling towards such Exhibitions in 1851 and 1862.

Then it was necessary, in order to obtain subscriptions, to hold meetings in this City and in the manufacturing towns, to explain the object and probable result of an International Exhibition, but although the success at these meetings was great, and between £60,000 and £70,000 was collected, they occupied so much time, that it was soon evident some other means must be adopted to raise money, or the great idea of an International Exhibition must be given up.

To prevent so unfortunate a result, it was suggested, almost at the last moment, to raise money on a guarantee for a very much larger sum than was at all likely to be required, and a few individuals boldly determined to incur the responsibility of the entire sum suggested, viz., £250,000 —His Royal Highness subscribing for £10,000.

Upon this instrument, the Bank of England agreed to advance, beyond the sum already subscribed, whatever might be wanted to complete the works, and from this moment all pecuniary difficulty was removed.

Now, ten years later, aware of the advantages

derived from the Exhibition of 1851, and having ample grounds on which to estimate the benefits likely to result from another, the public, as soon as this Society published a well-considered plan, came forward rapidly and liberally to sign a guarantee deed, upon which the Bank of England has agreed to make an advance sufficient to carry out the second great International Exhibition.

This deed is signed, to the amount of £414,600, by nearly 1,000 persons connected with or interested in Arts, Manufactures, and Commerce:—above 400 of whom, representing £220,000, are members of this Society; and, what is most remarkable, this great result has been accomplished without the excitement of a single public meeting, or any other appeal to the public than through the ordinary channels of this Society.

No one then can for a moment doubt that this list of guarantors very perfectly represents the public conviction that great good resulted from the Exhibition of 1851, and that the proper time has again arrived for challenging the world to exhibit its finest works in Art, its best and cheapest Manufactures, and to test the industrial progress each nation has made since that time. Let us then consider whether we may fairly hope to realise the expectation that the Exhibition of 1862 will be in every respect worthy of its time, and show such an advance in Art and in Manufactures—in Machinery and its appliances, as to justify the promoters in fixing ten years as a proper period for the recurrence of such undertakings. If this be satisfactorily proved, then we may safely predict that periodical International Exhibitions will become one of the fixed institutions of the country, and will be looked for by producers and consumers as the centre towards which novelty, improvement, beauty of construction and design, will be directed.

First, then, let us refer to our national progress since 1851.

The population of Great Britain has largely increased. In 1851 it was 25,180,555, and in 1862 it will probably be 29,000,000. In London there will be next year half a million more inhabitants than in 1851.

The people are better employed, and their social and intellectual condition is improved.

Crime, which for years previously to 1851 increased in a ratio beyond that of the population, is now happily decreasing.

In 1850, in England and Wales, 20,423 persons were committed for trial, and 76,494 were summarily convicted, the population being then 15,911,725.

In 1859, only 16,904 were committed for trial, and 74,769 convicted summarily, the population being in round numbers 18,000,000.

Railways have been extended from above 6,000, to above 10,000 miles.

The electric telegraph has become universal, and in every direction facilities for communication have been increased. We have repealed the duties on soap and paper, the only manufactures the prosperity of which was then thwarted by Excise restrictions.

We have abolished all taxes on the dissemination of knowledge, and have given increased facilities for the circulation of knowledge by post.

We have repealed the Import duties, or very nearly so, on raw materials, the produce of foreign countries.

We have admitted, free of duty, confident in our strength, the manufactures of foreign countries to compete with our own.

Old industries have been stimulated and improved. New industries have arisen.

In fine art, painting, and sculpture it is hardly possible, except in very extraordinary periods, that a marked change can be observed in a single ten years, but this country certainly holds its own as compared with the productions of other countries.

But a public measure, of great importance to the future development of the fine arts, should not be overlooked, I mean the Artistic Copyright Bill, introduced to the House of Commons by the Attorney-General, the Bill having been prepared by the Artistic Copyright Committee of this Society.

The object of this Bill is to give to artists that protection to their property which is now enjoyed by literature, and to give to foreign artists, sending their works to our exhibitions, the same protection they afford to English artists sending pictures or works of art abroad.

Photography, hardly known in 1851, has developed itself, and has become an important branch of art and industry, used alike by the artist, the engineer, the architect, the manufacturer, the merchant, and the magistrate. By it fleeting effects of nature are caught, and preserved for the use of the artist; old records, old works of art, decaying by the action of time, are copied and perpetuated. Those precious drawings—relics of great artists of old time—which were necessarily confined to collections in which they were carefully guarded, are rendered accessible to all; and we have multiplied, in marvellous reality, the sketches and studies by which master hands recorded the thoughts of master minds; the progress of works is daily recorded, for the information of the engineer; the finest tracery of ancient architecture preserved, in its exact proportions, for the architect; the manufacturer and merchant can transmit to, and receive from their most distant correspondents, exact representations of what they require to be imitated or produced; the soldier, sailor, and civilian on foreign service finds in photographic likenesses, and the facility with which they are

renewed, the means of retaining the fondest associations of home and country; and the criminal flying from justice is followed with means of instant identification. This is indeed an international application of art-industry.

In the preparation of colours for printing and dyeing, most important discoveries have been made by our chemists, to whose researches the manufacturing industry of the country is greatly indebted. The recently-discovered and most beautiful and brilliant colours, called the "Aniline" series, are produced from coal and its products, and the facility of their application is so great that a complete revolution is taking place in the processes of dyeing and printing.

In the manufacture of glass great economy has been introduced, and the process, just perfected, of transferring photographs to glass, and permanently fixing them by the action of fire, will add a new and beautiful style of ornamentation to our houses.

The manufacture of agricultural implements, and especially the application of steam power to them, has been so improved and extended that it is now a highly important branch of trade; and the exhibition of the improvements which have been made in our spinning, weaving, and winding machinery will afford interesting evidence of our mechanical progress in these branches of industry.

Marine telegraphy, only just accomplished in 1851—the public communication with Dublin having been opened in June, and that with Paris in November, 1852—has now become almost universal, linking together distant countries, and destined ere long to overcome the difficulties of separation by the ocean, be the distance ever so great.

In the manufacture of iron, improvements have also been made—new bands of ore have been discovered; and day by day we are economising its production, and a metal between iron and steel is now produced, at one process, which heretofore required two or more processes, alike expensive and difficult.

In artificial light our sphere of production is enlarged, and light is cheaper whereby hours are now available for industrial pursuits, and for the acquisition of knowledge by large numbers, which were formerly either unemployed or wasted

In steam power, especially that applied to railroads and to ocean steam navigation, economical appliances have advanced rapidly.

The use of coal for locomotives, in place of coke, and super-heating steam and surface-condensing in ocean steamers, tend to increase the power and economise the cost of these powerful engines of civilisation.

In shipbuilding, the past ten years have produced great changes.

Our navy and mercantile marine have alike advanced in scientific construction and in mechanical arrangements. The ocean steamers which were then employed in the postal service included but one of 2,000 tons—now there are many of nearly double that tonnage, with corresponding power and speed—increasing the facilities and decreasing the risk of communication with our colonies and foreign countries.

In the *Great Eastern* we see the practical application, for the first time, of screw and paddle to the same ship; we have enormous strength in her cellular construction; and we have greater speed, with power smaller in proportion to her size, than was ever before attained.

Constructed as she was to exhibit to the world one of the greatest triumphs of Saxon energy, and to be the instrument for the distribution of the results of our industry and intelligence in the shortest time and in the safest manner to our most distant and most valuable dependencies, it is lamentable to think that two years have nearly passed, and so much money been frittered away, with scarcely an approach being made to the accomplishment of the great national object for which she was built.

In the construction of our *Warrior* and *Black Prince* and other iron-plated ships, we have a combination of wood and iron by which our ships of war may almost bid defiance to whatever may be brought against them, being, both in size and power, far beyond anything which was contemplated in 1851; and machinery is now being constructed, having its origin in the block machinery at Portsmouth, by which the woodwork required for large boats will be so accurately prepared, that they will be put together in a few hours.

In printing great advances have been made. By the perfection of chromatic printing, views of distant countries, copies of celebrated pictures, most beautifully coloured, have been brought within the reach of almost every class, displacing pictures which neither improved the taste nor gave useful information; and by the application of most expensive and most beautiful machinery, to the printing of our daily journals, we have been enabled profitably to meet the increased demand caused by the cheapness of our newspapers. Invention and mechanical contrivance have thus kept pace with the requirements of intellect and the daily increasing love of knowledge; and, to crown all, the gold discoveries in Australia, but just known in 1851, and following those in California, in 1849, have supplied a medium of exchange when it appeared almost indispensable to the full realisation of the advantages springing out of the great impetus given to industry during the past ten years.

But there are two branches of industry not to be overlooked, which did not exist in 1851. The manufacture of arms of precision, and the

voluntary organisation of skilled labour to use them, both of which may at first sight appear antagonistic to the progress of Art, Manufactures, and Commerce, but are, in fact, their great protectors. War, a remnant of barbarism, must fortunately be infinitely more difficult, hazardous, and expensive, not only in the preparations for it, but in its results, when arms are constructed of such power that hardly any fortification or ship can resist them.

Fortifications and naval architecture now wear a different complexion to what they did before 1851. The manufacture of the Whitworth rifle and the Armstrong gun are new industries since 1851. The small gun, directed by high intelligence, throwing a large and destructive missile to a distance beyond any previous belief, becomes a more formidable instrument of warfare than the large forces of olden time, directed only by low intelligence and relying upon brute force for success; and in the perfection of these implements of war, costly though they be, we are as a nation deeply interested; for in so far as we are in advance of all the world in their manufacture and in our knowledge of how to use them, so are we safe from foreign interference. The better armed will rarely be attacked, and still more rarely successfully so, by the worse armed.

We hope, then, that while 1862 will show to the world the immense advance we have made in all that contributes to our material prosperity, and in all the arts of peace and civilisation, it will also show that we are as much advanced in our power—and more fully than ever alive to the necessity of being able—to protect them.

The effect of the progress we have made since 1851 is also shown by the rapid increase of our colonial and foreign trades, and the much greater interest which foreigners now take in England and English manufactures.

Then, after a period of great agricultural and commercial distress, we exported but £65,000,000 per annum, now we export £136,000,000.

Then India, governed by a separate authority, did not afford facilities for emigration, or to settlements being made by English capitalists.

Now that vast dependency, entirely under the government of our Queen, intersected by railways and new roads, and with steamboats traversing her rivers, will become, year by year, more intimately acquainted with, and larger consumers of, our manufactures.

Then Canada had recently emerged from a period of discontent and difficulty; now, it is one of the most—if not the most—flourishing and rapidly increasing in wealth and population of our colonies, with a system of railways and water communication unsurpassed anywhere; the bridge over the St. Lawrence being one of the greatest triumphs of engineering in the world.

Our Australian Colonies have not been left behind. The discovery of gold, although for a time it threatened seriously to affect the cultivation of the country, has so stimulated the tide of emigration thereto, that the supply of wool, almost as valuable to us as gold, has been maintained, and industry of all kinds has advanced most rapidly.

And if we look to foreign countries, we find France just entering upon a career of free-trade, from which it is all but impossible she can recede, while her people, as a whole, appear more friendly to us than at any former period. Our nearest neighbour and principal foreign competitor in 1851, then prohibited or levied such high duties upon the importation of English manufactures, as all but to exclude them from the country. Now, we have passports abolished, free intercourse encouraged, a low uniform rate of postage established, and a treaty of commerce under which our manufactures are admitted, which must tend, year by year, to increase the commercial transactions between us. In 1850 the value of the manufactures of the United Kingdom exported to France was only two millions (2,028,463); now they amount to between six and seven millions.

Holland, also following our example, has recently opened several of the ports of her East Indian possessions to foreign trade with all countries.

Russia, under the guidance of a wise and great sovereign, besides constructing railways and telegraphs, and promoting intercourse between the most distant parts of her vast territories, is emancipating her serfs from bondage, and making a large population at once free and industrious, and therefore larger consumers of the products of the forge and the loom.

China is still further opened to our industry, and bids fair to be one of our largest and best customers; and it is hardly too much to say that the effect produced in the late war on the minds of the rulers of that nation, by the wonderful power we exhibited with our rifles and Armstrong guns, had much to do with its early and successful termination; and if so, the entire expense we have incurred in their manufacture will be amply repaid by the great results achieved through their instrumentality in this one short campaign.

In Japan, Siam, Madagascar, the Phillippine Islands, hitherto almost unknown countries, we find vast populations seeking for our manufactures. I might enlarge at any length on such topics, but enough has been said to show that if the Exhibition of 1851 was, in the words of our Royal President, "to form a new starting point "from which all nations were to direct their fur- "ther exertions," that of 1862 must still more efficiently perform that function, inasmuch as the basis upon which it rests is broader, the nations

interested in the progress of civilisation and commercial freedom more numerous, and the population to be stimulated to exertion enormously larger.

All believe that 1851 did its duty. Can anyone doubt that, as the duty and the sphere of action of 1862 are more extended, so the results it will accomplish will be of greater value to mankind at large?

And here we may pause a moment to pay a tribute of respect and admiration to the memories of those great men who very much contributed, by their influence and personal exertions, to the success of 1851, but who have passed from us during the last ten years.

Among our statesmen and heroes, who attended the opening of the Exhibition, we have to lament the loss of Wellington, Anglesea, and Raglan, three great men, to whom England owes much of her glory and safety. We have also lost other great men, the greatest of England's engineers, Brunel, Stephenson, and Locke, all of whom took an active interest in the Exhibition, and whose advice and aid were freely given when required on any matter relating to the construction of the Crystal Palace.

Next let us refer to some of the leading features of the Exhibition of 1851, and first to the building, which was perhaps the greatest wonder and novelty of its time.

The Commissioners for 1851 advertised for plans, and 245 designs were submitted to public examination, but no single plan was so accordant with the peculiar object in view as to warrant its adoption.

The Commissioners then prepared a plan, but this gave way to the design of a gentleman, neither architect nor engineer, which at once commanded almost universal approbation.

I need not stop to describe the building of 1851. It had its merits and demerits. There was no pretension to architectural effect, but there was vastness and simplicity of design, with remarkable fitness to the purpose required; and the novel and beautiful effect produced by the enclosure of the large elm trees within it cannot be forgotten by any one who saw it. Moreover, all this was attained at a smallness of cost which was again one of the marvels of the structure; but it is hardly too much to say that, had not Sir Joseph Paxton's plans met with the approval of such men as Stephenson, Brunel, and Cubitt, the public would not have allowed so apparently frail a structure, designed by a non-professional man, to have been erected for such a purpose. Its success was, however, perfect; and the question now is, what have the Commissioners of 1862 done to secure the erection of a building worthy of the occasion, and which will not disappoint those who saw and admired the building in 1851.

Having before them the failure of the public competition in 1851, the Commissioners have, it appears to me, wisely determined to take the full responsibility of selecting a design; and although contemporary criticism may expose architectural inconsistencies and faults in the plan adopted, as a whole, I believe it will be approved, and the internal effect of the two domes rising one at each extremity of the great aisle will be grand and imposing, and well calculated to exhibit to advantage the works of art and the manufactures which will be collected within the building.

Then, again, as paintings are to form an important part in this Exhibition, it became absolutely necessary that the gallery to contain them should be a substantial erection, and not subject to accident or to the sudden variations of temperature unavoidable in an iron and glass building.

Considering then that the effect within, and the safety of everything entrusted to the Commissioners, are of infinitely greater importance than the exterior of a structure which, very possibly, may be only required for a few months, the Commissioners have, I think judiciously, resolved, at the expense, perhaps, of external appearance, to produce an interior which, while entirely different from that of 1851, and from that erected in Paris in 1855, shall possess originality and beauty sufficient to make it an attraction, if not superior, at least equal to that of either of them.

From the building let us pass to its probable contents.

That they will surpass in interest, beauty, and value, those of 1851, I have little doubt, though there can hardly be the same novelty; but assuming, as we may fairly do, that both English and Foreign industry will be as fully and as attractively represented as they were in 1851, and that in addition to anything then exhibited we shall have the largest and finest collection of modern paintings ever brought together in one building in this country, there can be no doubt that the Exhibition of 1862 will cause as much sensation in the public mind as that of 1851.

We have now no fears, either political or industrial, to allay—no ignorant prejudices, national or social, to overcome—no vague auguries of indefinable mischief to counteract—but we have to aid in the collection of visitors a strong conviction that great advantages were derived from the knowledge obtained at the Exhibitions of 1851 and 1855, by those who thoroughly studied them, and we have also greatly increased facilities for their conveyance from all parts of London and the country, and indeed from all parts of the world, to the spot selected for the site of the Exhibition.

The increase of the population, the increase of our metropolitan railways, the reduced rates of conveyance, the recollection of the past in the

minds of those who saw it, and the desire to see an International Exhibition by those who were unable or too young to see the last, will together ensure an amount of success to satisfy the expectations of the most sanguine.

And here I will mention a few facts which justify us in expecting a large increase in the number of foreign visitors. The number who visited England in excess of the previous year, between May 1 and September 30, 1851, was only 42,913, whilst the number of foreigners who visited the French Exhibition in 1855 was above 160,000, of whom 40,000 were English. We may, then, fairly anticipate that there will be a great increase in the number of foreigners coming to England in 1862 over those who came in 1851, as all admitted that the English contributions to the Paris Exhibition occupied a great deal of their attention, and excited the liveliest interest among them. Moreover, the important changes which have taken place in the commercial relations of France and England must tend to increase the curiosity of manufacturers to see the latest and choicest specimens of British industry, and surely we may attribute an important place in promoting that improvement in the French tariff, which now admits many English manufactures to France, to the exhibition side by side of English and French manufactures in London and Paris in 1851 and 1855, and to accomplish which the Governments of both countries, appreciating the importance of the occasion, temporarily suspended their customs regulations.

On the whole, then, looking to the success of the Foreign department in 1851, to the preparations now being made in France and other countries, for 1862, proving they are not afraid of placing, for the third time in eleven years, their choicest productions in friendly rivalry with ours, and also to the industrial progress which has been made under more liberal tariffs than then existed, we have sufficient reasons to justify the confident expectation that the foreign department will be as well supported and as successful in 1862 as in 1851.

There are, however, some important points of management and arrangement upon the decision of which much may depend, and which appear to me to require the most open and full consideration and discussion by the public. I mean,

1. The system of prizes adopted in 1851 and 1855;

2. The arrangement of manufactures and works of industry—whether it shall be geographical or in classes; and,

3. The rates of admission.

First, as to prizes. Can they be adjudicated with such perfect fairness and justice as to ensure their being allotted to the proper persons? If they can, then the object of awarding them is attained, but if not, they are the means of inflicting great injustice on every other exhibitor, and on the community at large, who are misled by a wrong adjudication.

The question then arises—Can juries, selected as juries must be, possess collectively sufficient general, practical, scientific, and manipulatory knowledge to decide unerringly upon the relative merits of competing manufactures, machines, chemical products, and works of industry of all kinds and of all values, often produced from similar materials, but which, being made for different climates and purposes, may be very dissimilar in character and appearance, though belonging to the same class.

Is it probable that a dozen men can be so fully acquainted with every variety in the class upon which they have to adjudicate as to ensure entire correctness and justice in their decision? I believe this to be simply impossible, and although I have not the slightest wish to impute improper motives to anyone, or for a moment to suggest that any person acted otherwise than to the best of his ability, I believe it is an admitted fact that both in Paris and London the distribution of prizes gave dissatisfaction, and that they were in many cases incorrectly awarded. That juries should be appointed to examine each class of subjects, and to report upon the progress made since 1851 is most desirable, and such reports would be of great value to every exhibitor and to the country at large but it appears to me, upon a careful consideration of all the difficulties, highly undesirable that prizes should be awarded. A prize, given with the utmost fairness, can be but useful to one individual, and the advantage gained by a prize would, in most cases, be far beyond the actual superiority of the article rewarded over the next in merit; but if awarded incorrectly, still more if awarded without a due appreciation of all the various considerations which constitute superior excellence, a great injustice is inflicted on many.

To avoid the injury caused by the slightest error in the judgment of a jury is of infinitely greater importance than any benefit which can arise from giving a reward; and it appears to me that the system of rewards is calculated to divert the attention of exhibitors from the object they ought to have in view, and instead of looking solely, as they should, for the sympathy and support of the public, they will try to obtain the approbation and verdict of the jurors.

Then, as regards the classification of products or manufactures, two plans are suggested—one, that of 1851, the geographical arrangement, under which the Art and Industry of each country is exhibited in one compartment; and the other, an arrangement in classes, so that all similar products or manufactures, come from where they may, will be exhibited together. Theoretically, this appears to be the best plan

for enabling the ordinary run of visitors to obtain most readily a knowledge of the progress of each country; but would it not tend very much to lessen the interest and pride of the smaller foreign exhibitors in the Exhibition, who would naturally prefer seeing the works of each country separately?

And, moreover, the theoretical advantage contemplated by the classified arrangement is one more in name than in reality; for those conversant with cotton, or silk, or woollen fabrics, will have no difficulty in properly appreciating the comparative merits of those belonging to each country, although they are not placed in absolute juxtaposition. So with hardware, porcelain, machinery, &c., and if, in addition to such personal inspection, we have the reports of Juries composed of competent persons, on each branch of industry, the object of a classified arrangement will be attained without any offence being given to any person or nation. It will be much easier to satisfy a foreigner in the arrangement of his goods in the space allotted to his country, than if distributed one in one part of the building and one in another, mixed with those of other nations.

I now come to the rate of admission.

In referring to the lowest rate, which, in 1851, was 1s., we find that this produced more than 6-10ths (.622) of the receipts at the doors, and represented 4,439,419 persons out of 6,039,195 visitors, or about three times as many persons as paid the higher rates of admission.

In Paris the 1 fr. rate also produced more than 6-10ths of the total sum received at the doors (·654); but there was also a lower rate of 4 sous, so that, at 1 fr. and at 4 sous, 4,280,040 persons were admitted out of the 4,533,464 who visited the Exhibition.

These figures are more significant if we compare the populations of Paris and London.

At Paris, with a population of 1,174,346, there were 2,351,031 visitors paying 1 fr. and upwards, or 2·01 visits to each of the population.

In London, with a population of 2,362,236 there were 6,039,195 visitors, paying 1s. and upwards, or 2·5 visits to each person, a curious coincidence of visits to the population. But, in addition to the 2·01 visits of the Paris population, paying 1 fr. and upwards, 2,182,433 of the working classes were admitted at a charge of but 4 sous each.

We are, then, fairly entitled to say that the 1s. rate nearly excluded the working classes (except where the liberality and good feeling of employers found the means), who made 2,182,433 visits to the Paris Exhibition, and which class, had the same facilities been afforded to them here, we may fairly assume, would have made above 4,000,000 visits to the London Exhibition, and contributed in like proportion to its success.

For, as the number of visits by the people, in proportion to the population, paying 1 franc and upwards, so nearly coincided in both countries, it is not unreasonable to suppose that, had our working classes been admitted at a proportionate rate, they would have been quite as anxious to see the Exhibition as the working men of Paris.

I am well aware there is a strong objection in the minds of many to a lower rate of admission than 1s. I do not, however, share in the objection, nor do I believe it is founded on sound principles, and certainly not on the great principle of universality upon which an International Exhibition rests.

The object of such Exhibitions is not only to amuse the rich, but to teach the people. The object is not only to give information to the merchant and manufacturer, to enable him to extend his works and increase his gains, but to show the people the progress of their rivals in trade and manufactures, that they may learn thereby in what manner best to exert their skill and intelligence.

The object is to educate nations, not classes. It is to show to all the part taken by each in the great work of the world's industry; it is to show that the production of very few commodities is confined to one country, or to one set of workmen. It is to show that that country which exercises the highest intelligence and the greatest industry in the conversion of the raw materials which nature so lavishly provides for the use of all, will be most successful in the industrial race which civilised nations are so honorably running one against the other. In what respect, then, do our industrious classes require education more than in a knowledge of the mechanical and artistic works of other countries, and the rate or cost at which they can be produced? And how can lessons on this subject be given with such effect, or be taught by a schoolmaster so well calculated to impress the mind and memory, and be so free from all suspicions of interested motives, as by the personal inspection of the articles collected together at an International Exhibition?

They will there see the works of foreigners—will be able to examine them at their leisure, and to satisfy themselves in what respect they are inferior to, and in what they excel, their own.

They cannot then refuse to believe that they have powerful, intelligent, and ingenious competitors; or that if, by unwise combinations to constrain the free operations of men, masters, or capital, they increase the cost of manufactures or the difficulty of executing public works, other hands, able and willing to work, can be found, and at a rate of wages which would make them, if once brought here, very formidable rivals.

I may be allowed, perhaps, to digress for a moment to state one effect of the late strike among the painters. A machine has just been perfected for executing certain kinds of painting at a wonderfully low rate and with great speed,—a public advantage, no doubt, but injurious for the moment to the body whose ill-advised movement called it into existence.

It is then, I think, a first duty of the Royal Commissioners to make such arrangements as will open the Exhibition to the largest number of the working classes, their wives and children; the only limit being that required for the preservation of the property and the maintenance of perfect order; and as both of these were accomplished in Paris, there ought to be no difficulty in London. Fortunately we know by their free admission to our National Gallery, to Kew Gardens, and to the British Museum, &c., that the industrious classes may be safely admitted to see and to examine valuable works of art and industry, without the slightest fear of injury arising therefrom, and we now so frequently see 20,000 or 30,000 visitors together at places of amusement that no difficulty can arise as to the preservation of order.

Many, I know, say 1s. is low enough, but is not this a vague assertion, repeated without due consideration, by those who forget or do not know, that 1s. multiplied by the ordinary number of a working man's family—and working men rarely go to places of amusement without them, and it is most desirable this feeling should be encouraged—becomes a sum, which is prohibitory to all but a few of the most enterprising and best paid artisans, and certainly cannot be considered as encouraging the attendance of the working classes as a body, whose instruction in the power and capabilities of foreign workmen is, speaking nationally, of greater moment than the amusement or instruction of the classes immediately above them.

There is, however, a practical objection advanced by some, whose desire to extend to the utmost the benefits to be derived from the Exhibition cannot be doubted, and that is the impossibility of accommodating the number who would apply for admission at a lower rate than one shilling.

To such I reply, first let one day a week be appropriated to working men—Monday, for instance. If this be not enough, give them two, or even three days weekly. Their numbers are so great that they have a right to a fair proportion of the time for which the Exhibition is to be open. The difficulty of regulating their admission should not be allowed to exclude them all from the opportunity of obtaining information most valuable to them as a class, and as individual members of that class.

I must next notice the objections which have been urged against holding an Exhibition in 1862. They are two. One, including all sorts of minor objections, prejudices, and interests, is expressed simply by saying it is too soon—the public take no interest in it—manufacturers did not gain enough by the last to repeat their contributions.

The second is, that in the present political state of the world, Europe, Asia, and America, it is unwise to incur the risk of failure in so important a national undertaking.

To the first I reply, it is not too soon in the estimation of those who are to fill the building; if, on the one hand, they become guarantors for the expenditure, and, on the other, apply for spaces for exhibition far beyond anything known in 1851, threatening to render the contemplated structure, large as it is, insufficient to meet the demands of intended Exhibitors—nor when our colonies and foreigners are as ready as before to contribute their share to another great collection of the world's industry.

If these be facts, as they are, the objection that 1862 is too soon after 1851 and 1855, to hold another Exhibition, fails entirely.

But there is another reason in which the public are interested why Exhibitions, if once held, should be repeated periodically, and not at too distant periods.

Prizes if given, or the honourable mention by juries, or the unanimous praise in the daily press, of any particular production or manufacture, gives a virtual monopoly of its supply to the producer, to the injury of consumers, until, at a succeeding Exhibition, the merit of other similar productions, is pronounced by competent authority to be equal, or superior to it, or until new articles, which but for the opportunity thus afforded could not have been brought fairly before the world, are compared with it.

The second objection cannot be answered by an appeal to facts, but may be disposed of as effectually by an appeal to reason and policy.

That, in the words of a weekly periodical, distinguished for the ability, though not always for the liberality of its writing, we should choose the time for an Exhibition:—

"When Italy is in the agonies of self-reconstruction; Austria in the throes of a life and death struggle for existence; France sore all over with jealousy and suspicion of her insular neighbour; Prussia in the thick of a quarrel with Denmark; Russia working out the vastest social problem that ever monarch undertook to solve; Turkey griped to death by her protectors; India racked by famine, and passing through a financial crisis; and the United States split into fragments," no one will contend. Nor, on the other hand, do I think, that when this country has once determined to hold an International Exhibition, any properly constituted English mind would approve of its being deferred because such events had arisen in foreign

countries during the progress of our arrangements. Indeed, the French Exhibition of 1855 was held during the Crimean war.

Should we be too easily influenced by the political events passing in other countries it would be difficult to find a time to hold an Exhibition, so that such an argument would be equivalent to saying that an International Exhibition should never take place. This reasoning is inconsistent with the object of such demonstrations, for if their highest and most interesting purpose be to cultivate the relations of peace, amity, and commerce between nations for the benefit of all, it is just at the time when Governments appear to be forgetting their duties to their people, or when nations are forgetting their duties one towards the other, or when people of the same nation, stirred up by the demagogue or bigot, enter on the strife of war, that England, confident in her own power, confident in the principles which guide her rulers and govern the actions of her people should show, that in the midst of wars and rumours of wars, she can uninterruptedly pursue her peaceful and industrial career, and be ready to exchange everything she produces with every other country, and to expose, for the inspection of all, the latest results of her national industry.

I think, then, the political aspect of the present time ought not to check the progress of the Exhibition, and I think the strong assurances of support which we have received from our colonies and from foreign countries—the great extension of our commerce and trade—the improved social and intellectual condition of the people—the position we maintain in the production of works of fine art—our chemical and scientific discoveries, and our improved and new machinery applied to all branches of industry since 1851—setting up in high relief as they do, the advantages derived from the peace and freedom we enjoy, ought to stimulate our exertions to make this Exhibition worthy of the great nation which undertakes it—of the great country in which it will be held—and of the great, wise, and good Sovereign under whom we have the happiness to live.

DISCUSSION.

Earl Granville, K.G., rose and said—I have been informed by the Chairman of the Council that it is the desire of the Council that I should make a few observations following the paper which we have just heard. I remember hearing a story of a distinguished and witty diplomatist, who, being desirous to renew protocols which had been suspended for twelve months, observed to his colleagues, "Here we are, become younger again by one year;" and now, finding myself in the presence of His Royal Highness, presiding over that Society which had such an important influence on the success of the International Exhibition of 1851, I should be entitled, if certain warnings did not tell me to the contrary, to claim for myself to have become younger by ten years. You will allow that I rightly appreciate what is expected from me when I say that we, the Commissioners for the Exhibition of 1862, came here to learn and not to teach; and that knowing the limit of time which you rightly impose to the duration of your meetings, knowing also that others are going to take part in the proceedings, and that there is a hope that His Royal Highness himself may be induced to make a few remarks this evening, you will feel I am doing that which is right and most respectful to him and to yourselves, if I limit my observations, on the admirable paper of Mr. Hawes, to the smallest possible space. Speaking for myself, and I am sure I speak also for my colleagues—for as you may suppose, we are pretty well-informed as to one another's views upon the leading features of the Exhibition which is to take place next year—I have no doubt it has been to them, as it has been to me, a source of singular gratification to hear, in this most interesting paper, most exhaustive both as to the principles and the details of everything connected with the Exhibition, that with the exception, I believe, of only one point, all that Mr. Hawes has recommended entirely agrees with our views, and with the decisions which we have already put forth. I perhaps may say with regard to this one point—that of Prizes—that the decision we have announced was put forth, not only after very considerable deliberation, but also after considerable hesitation. It is one on which we have not so entirely made up our minds, even at the present moment, but that we are most grateful for the opinions and advice of those best acquainted with the subject, and we must not omit from our consideration the wishes of foreign exhibitors in regard to this matter. There is one point which especially struck me in the paper, because it brought to my recollection much that had passed last year. It is that part in which Mr. Hawes so graphically and vividly described the great,—the almost overwhelming opposition that was raised to the Exhibition of 1851, before its great success became manifest and acknowledged. This has been so little the case on the present occasion, that, remembering as we do the great contest that took place at that time, I almost felt some little fear that we have not had opposition enough to keep us entirely up to the mark. What opposition there has been, I may say, has been generally of a friendly character, and has been confined to the architectural portion of our proceedings. I am glad to hear a favourable opinion stated by Mr. Hawes, and favourably received by this meeting, with regard to our intentions in that respect; and I may say that those who were present at another cere-

mony this morning, and saw the buildings connected with those beautiful Horticultural Gardens—the conservatory and lower arcades—will agree that we have cause to entertain full confidence in our architect, and that we shall achieve something like success in the building we purpose to erect, notwithstanding the moderate sum we feel justified in expending and the large surface of ground which we propose to cover. With regard to our proceedings up to the present time, I do not like prematurely to boast, because some unexpected difficulty may arise to-morrow, but at the present moment I am not acquainted with any obstacle, or, to use a vulgar expression, with any hitch that is likely to interfere with our success. The feeling which has been displayed in the great centres of trade is highly satisfactory, and the support which we feel we derive from an attendance like the present, representing the progress and the intelligence of the metropolis, is also a source of the greatest satisfaction to us. With regard to our colonies, nearly all have come forward in the manner we could desire. I have had information from Lord Canning that the people of India are most anxious to promote this undertaking; and although there are, at the present moment, some difficulties connected with India—difficulties which are met with sometimes in public as well as in private life, owing to which there may not be so large a fund at the disposal of the Indian authorities for the purpose of assisting us, still we have reason to believe that now, when India for the first time has been confided to the Crown, instead of being governed by a Company, the Exhibition will be such as satisfactorily to show the productions of that great and interesting empire. With regard to other countries of the world, we have received assurances of the most satisfactory character. I passed a few days in Paris last week, and there I found that a Commission, composed of the most distinguished persons, had been nominated, with Prince Napoleon as its President, for the purpose of carrying out the wishes of the Emperor, whose desire is that no expense may be spared in the preparations for the French portion of the Exhibition, which promises great success. I had an interview with the Commissioners, and I found that there was a most cordial desire to co-operate with us, and to take care that France shall distinguish herself in this friendly encounter. Indeed, so far from feeling any doubt of the French taking an active part in this great enterprise (notwithstanding that some little feeling of a protectionist character may operate, but which, I am told, will not tell upon individual exhibitors), the danger is not that the French nation will be unworthily represented, but rather that such exertions will be made that, if we do not put our right leg forward, we may not be able to maintain the creditable position which we held during the last Exhibition. I am sure, however, that where there is the will there is the way, and I have no doubt as to the Exhibition being a great success. There is one point however connected with the meeting to-night that I may be allowed to advert to, namely, the great gratification, and I may say the gratitude, which the Commissioners for the Exhibition of 1862 feel towards the Society of Arts for the meeting which is held here to-night, for the subject chosen for the meeting, and for the presence of His Royal Highness presiding on this occasion. There is much that I could say, if His Royal Highness were not present, with regard to his connection with the Exhibition of 1851; but all who were connected with the working of that Exhibition, will, I am sure, feel that it is not the phrase of compliment, but the strict and naked truth, when I say that but for the personal qualities, the moral courage, the industry, and, above all, the knowledge which His Royal Highness possessed on this subject, combined with the position he held, that Exhibition not only could not have attained the great success it did, but must have proved an utter and lamentable failure. The first question put to me on the Continent was, "Do the Queen and His Royal Highness the Prince Consort take a real interest in the success of this Exhibition?" I stated that, although it seemed unreasonable to expect that His Royal Highness should evince the same absorbing interest in the Exhibition of 1862 that he did in that of 1851, I was sure he took a deep interest in the success of the present undertaking. Indeed, if the feeling had once got abroad that Her Majesty and His Royal Highness did not entertain the same cordial good wishes for the success of this Exhibition that they did for the former one, it would have damped the feelings of all—whether those connected with the administration or those who were called upon to exhibit. I think the answer given this evening, by the presence of His Royal Highness at this meeting, is so conclusive, that I trust it is not unbecoming in me to express, on behalf of myself and colleagues, our grateful sense of the advantage to us which this meeting will be. I have to apologise to you for occupying so much of your time with my remarks, and to thank you for the kind attention with which you have listened to me.

Mr. John Dillon said,—It is no uncommon thing in discussions in this room to explain that the particular matter under consideration is of great importance to some one class or some one department of men in this or some other country. There is however this special exception and peculiarity in the present case—that it would be difficult to say what individuals, or what class, or what community of men are not interested in

the subject now under discussion. The Exhibitions of 1851 and 1862 have necessarily been compared with each other in the addresses which have already been given, and it is impossible to think of the one without recalling and comparing it with the other; but there is one peculiar difference by which the Exhibition of 1862 may be distinguished from that of 1851. The Exhibition of 1851 was, as we know, the first—and it may be supposed we have to say that of 1862 is the second; but there is an essential difference between the two. The first was an untried experiment—it was a kind of youthful exercise of our manufacturers; but this is a more mature and well-considered attempt to make these Exhibitions periodical, and of comparatively frequent occurrence. The term of ten years has been fixed upon for that repetition, though by accident almost it has become, in the present instance, eleven years. It will be a kind of decennial census — not of our population, but of our powers and of our progress—a census, not of our numbers, but of our wealth, our talent, and our industry. When I recollect the room in which I now stand, and I see it ornamented by the beautiful works of Barry, you will see, for the purpose of celebrating the progress of Arts, Manufactures, and Commerce, he has brought together the great men of all nations of the earth. There we have Pericles, and Sir John Moore, and Benjamin Franklin—men of various ages and various countries, and it would be a subject worthy of the talent of such a painter if he could pourtray the British people and those of distant countries depositing their works of art and industry for purposes of emulation and improvement in the forthcoming great Exhibition, established by the people themselves, and presided over by a British Prince. It is now eleven or twelve years since, at one of the earliest meetings for the purpose of promoting the first Exhibition, at a meeting held in the City of London, I ventured, in reference to the then coming plan, to quote the words of a great poet, which, with more confidence and more appropriateness I may now repeat:—

> "Such blessings peace to happy Britain brings;
> These are imperial works, and worthy kings."

It is in such a spirit that we, the working men of England—the traders, merchants, and manufacturers of England—rejoice to see your Royal Highness coming amongst us to promote these plans, and that improvement which this undertaking is calculated to produce. In past history we have shown ourselves powerful in arms. Let us hope in the more peaceful triumphs, every ten years, of labour, skill, and manufactures, that we may induce our neighbours, our rivals, our enemies, to turn their swords into ploughshares, and to learn the arts of war no more. I cannot conclude the few remarks with which I have been permitted to trouble you without alluding to another subject. It will be most gratifying to the country at large, most calculated to ensure the success of this undertaking, and most agreeable to other nations, to know that our Queen and her Royal Consort, support, approve, and patronise this effort of our industry.

Sir Thomas Phillips: I venture, Sir, to follow the observations which have been made by congratulating the members of this Society upon the present position and prospects of the International Exhibition of 1862, and by congratulating you, Sir, as the President, and the members generally, upon the successful result of those preliminary measures by which the present position of the undertaking has been achieved. The difficulties in the way have not been light; the work to be done has been, on some occasions, difficult. The interests to be reconciled were occasionally conflicting, and the feelings which it was necessary to harmonise were sometimes discordant. But in the midst of whatever work was to be done, the Society never faltered in its estimation of the importance of the object, or the national value of the cause which we are now assembled to promote. Nor did it ever falter in the conviction of the practicability of establishing this Exhibition, provided the undertaking were conducted with reasonable prudence, and with that zeal and industry with which Englishmen, when in earnest, are accustomed to conduct their undertakings. Your Royal Highness is well aware that there were three wants to be supplied—first the site, next the funds, and thirdly a body of gentlemen to manage the Exhibition in whom the public would have confidence. With regard to the site, the Commissioners of the Exhibition of 1851 agreed to grant the site gratuitously, for the purposes of the Exhibition of 1862, whereby, as it seemed to us, they tendered a graceful recognition of the claims upon them to give every aid in their power to the establishment of Exhibitions. The public responded nobly to the appeal of the Society, by guaranteeing abundant funds for the undertaking; and it is a matter of gratification in which you, Sir, as our President, must participate, that so large a number of contributors to the guarantee fund are members of the Society. With regard to the management of the Exhibition, we were fortunate enough to name five gentleman whose nomination, from the first, secured the public approval, and I may say, tended in no slight degree to promote the success of the undertaking. I may add, that we feel deeply indebted to those gentlemen for undertaking a duty which is very arduous. I am not sure it may not prove thankless; at all events it is one that can hardly be rewarded to the extent it deserves. Of their merits the public will judge, no doubt, chiefly by the success or failure of the

Exhibition. I do not say that is a true test, but it is the test to which all great undertakings are subjected. With regard to your Royal Highness, I cannot conclude without addressing a few observations to you, Sir, personally. Undeserved praise would, I am sure, be as distasteful to your Royal Highness as to any other person in this room; but I feel bound, on the part of the Council, whose organ I am, to express, in the presence of this meeting, a grateful sense of the assistance which we have received from you at every stage of this undertaking. Whenever counsel was needed, and whenever the influence of your Royal Highness's position was required, the benefit of that counsel and of that influence was given. I will say no more than to express, on the part of this meeting, the grateful sense we entertain of the confidence which the contributors to the fund have reposed in us, and the readiness with which they undertook to supply the funds, and thereby secure, as I believe, the success of the International Exhibition of 1862.

His Royal Highness the President, said—After having heard the interesting observations which have fallen from the gentlemen who have addressed the meeting this evening, it is not my intention to trouble you with any lengthened remarks of my own. Lord Granville has referred to the fact of my presence here as giving an evidence of my interest in the success of the coming Exhibition of 1862. I should be sorry to leave you to draw, as it were by inference, a conclusion from my presence alone that I take that interest, and I wish you to hear from my own mouth that I do take that interest. As to what Sir Thomas Phillips has said with regard to what I have been able to do to start you on the right road, I have done with great willingness and pleasure; and I can assure you it is a real privation to me to be prevented, by the avocations and duties of my position, from being able to give the same amount of time and labour to this Exhibition that I was privileged to give to the one that preceded it. Gentlemen, you will succeed. You are in earnest; and being in earnest you will succeed. I can congratulate you upon the steps that you have taken. You have got an able body of managers, with all of whom I am well acquainted; and I know from personal acquaintance that they are thoroughly conversant with the work which you have imposed upon them. You have got an able architect, in a young officer of Engineers, who has, as Lord Granville says, to-day shown by the works which have been opened in the Horticultural Gardens, that he is capable of vast designs, of novel contrivances, and possessed of great taste. Gentlemen, Lord Granville and Sir Thomas Phillips have referred to foreign nations. I happen to know that foreign nations do look with favour upon this Exhibition, and are ready to come and measure their strength with you. I need not repeat the warning and encouragement which Lord Granville has thrown out to the manufacturers and artists of this country, to do their utmost, in order to maintain the position which they so gloriously took on the last occasion. Gentlemen, the duty which I have now to perform is a short and pleasing one. It is that of asking you to return thanks to Mr. Hawes for his able and valuable paper. He has taken a comprehensive view of all the points which it is of importance for us to consider with regard to the great undertaking before us, and has expressed his hopes of the success of the undertaking, based upon what I believe to be a perfectly true picture, and I may be allowed to say a most gratifying picture, of the progress of this nation. I beg to propose the thanks of the meeting to Mr. Hawes for the paper he has read.

The vote of thanks having been passed,

Mr. Hawes said, I beg to thank your Royal Highness and the meeting for the kind manner in which my paper has been received. It was a pleasing duty for me to comply with the request of the Council that I would read a paper on this subject; and it is gratifying to know that the sentiments I have embodied in this paper have been so well received by the distinguished body whom I see around me.

THE BOMBAY MECHANICS' INSTITUTION.

The following has been received from the editor of the *Mechanics' Magazine*:—

We have received, at the hands of a gentleman just returned from India, a very interesting account of the above Institution; and as the original promoters of this magazine were undoubtedly the main originators of the London Mechanics' Institution—the parent of all Mechanics' Institutions—we have pleasure in referring to the first of the class established at Bombay.

In 1847, a few of the foremen connected with the engineering and mechanical branches of the East India Company's works at Bombay, first directed their attention to the formation of a Mechanics' Institution, and having enlisted the sympathy and support of Sir Robert Oliver and Sir George Clarke, their proceedings soon assumed a practical form, and before the end of that year the nucleus of the present flourishing Institution was established. It would be impossible to omit mentioning the names of three gentlemen who especially exerted themselves in the cause at that time, and who may be regarded, therefore, as the founders of the Bombay Mechanics' Institution—Messrs. Hodgart, Johnstone, and Mackenzie. The usual up-hill fight had to be fought, of course, but it was manfully waged and successfully accomplished. The Institution pursued thereafter "the even tenour of its way," until the year 1855, when it was re modelled, enlarged, and established on a wider basis. It has now its library, well-stocked with scientific works as well as those of general literature; its reading-room, upon the table of which, on the arrival of every mail, are placed all the mechanical serials of the metropolis, and nowhere are they read with more zest; its classes well attended by juvenile members, and supplied with excellent teachers; its lecturers, its *soirées*—and, in short, all the collateral advantages which pertain to a well-regulated English Institution.

As a proof of its liberal and cosmopolitan character, we cannot do better than furnish an extract from the retiring address of its late president—now, we believe, in this country in search of health—J. J. Berkeley, Esq., Chief Engineer of the Great Indian Peninsular Railway. At the annual meeting of members of the Institution, held on the 9th of April last, Mr. Berkeley observed as follows:—"We are essentially a public body, representing in our list of members almost every class of the Bombay community. No conventional distinctions are admitted in our rules. Among the natives *caste* is no bar to their connection with the Institution, nor is it recognised within our walls; while among Europeans, the officer who holds her Majesty's commission receives no warmer welcome on election, nor enjoys any greater privilege in our proceedings, than the youngest tyro in an office or a workshop."

Surely, no more conclusive evidence of the free, noble, and tolerant spirit which pervades the management of the Bombay Institution is required than this.

New societies are springing up around it, having for their objects the mental recreation and improvement of their members; and of these may be mentioned the United Service Institution, just inaugurated; the Bycutta Book Society, established mainly by the exertions of Mr. Woolterton; and the Library Association, flourishing under the auspices of the Rev. Mr. Carlile.

Home Correspondence.

THE FIBRE-YIELDING TREE MALLOW.

Sir,—In a letter on the Tree Mallow (*Lavatera arborea*, Lin), which I addressed to you last June, and which was published in the *Journal of the Society of Arts*,* I mentioned that the inner bark of that plant was evidently well-adapted to the making of cords, ropes, mats, &c.

I now briefly resume the same subject, and in doing so I take the liberty of presenting the Society with a small piece of rope, which is roughly manufactured with that material only, and without any hemp. This specimen will be seen to be of a coarse texture, but very strong, and the ropemaker, who prepared it last December, told me that, as it received a greater degree of strength by being immersed in water, he thought it would prove of great service for ship purposes. But he was of opinion that it was less capable of receiving a bright polish, like hempen cord, and that it was not so well-adapted to the finer sorts of cord, &c.

I must, however, explain that the specimen of rope sent herewith was made with the fibre from a plant of only a single year's growth, and since the plant itself does not attain its full maturity until two years old, I think the fibre would be improved, and probably become less coarse, if it were not used until it had arrived at that age.

The ropemaker further stated that in preparing the fibrous bark, it gave out a vast deal of mucilage, and he concluded that it might be advantageously used in the making of paper. But this, as yet, I have had no opportunity of trying. I am, &c.,

JOHN HOGG.

,Sergeant's-inn, Temple, May 21.

Proceedings of Institutions.

Derby Working Men's Association.—The report for the year ending September 30, 1860, its fourth year's existence, says, that the reading-room during the past year has been liberally supplied with newspapers, partly by gifts from various friends and partly by purchase, and the walls are now adorned by the valuable maps, part of the grant which the Association received from the Trustees of "The Working Men's Memorial of Gratitude to Sir Robert Peel." A considerable addition has been made to the books by the valuable volumes which formed the main part of the grant of £15 given to the Association from the Peel Memorial. The library now contains about 550 volumes, and has been so largely used by the members that the Committee are most anxious to add to it as soon as their funds will allow them. Lectures have not engaged the attention of the Committee during the past year, partly from the doubtful success which the efforts of other similar Associations in the town have met with, and partly from their wish to leave the office of providing lectures to the other societies, while they exerted themselves to secure the success of the Saturday evening "Literary and Musical Entertainments." The balance of the first short series of these popular gatherings was £7; on the second season of twenty-four entertainments, in the Temperance Hall, it was £29 15s. 2d. During the summer months social gatherings of the members on a smaller scale were held in the reading room, when the tables were adorned with flowers and furnished with illustrated books, stereoscopes, and other objects of interest, and in the course of the evening music, readings, and recitations were given. There was no charge for admission to these pleasant conversazioni, but the members were freely invited, and had the privilege of introducing their friends. The classes have again proved a failure, chiefly from the fact that the members of the Institution are too hard worked during the day to be attracted by the charms of learning; and perhaps it would be well at once to give up the discouraging effort to maintain classes, and to rest satisfied with the fact that efficient night schools are open to adults in various parts of the town, and that those who are determined to acquire learning will struggle through every disadvantage, while no facilities for study will attract those who have not got that resolute determination. A chess and conversation room was opened early in the winter, and has been much used by the members. The Committee regret that the number of members has been rather below the average of former years. The contributions from ordinary benefit members since the foundation of the Association have been:—First year, £27 18s. 8d.; second year, £31 0s. 2d.; third year, £34 14s. 10d.; fourth year, £28 8s. 0d. Indeed, had it not been for the subscriptions and donations of honorary members, who derive no benefit from the Association, and which have amounted in the four years to more than £200, it would have been impossible to maintain the Institution. But having out-lived these dangers of the past, the present financial position of the Association is encouraging. The penny bank continues to be much appreciated, and is promoting provident habits in a large number of homes. The total amount received in the four years ending February 25, including sale of pass books, was £5,227 3s. 7d.; amount withdrawn in same period £4,463 17s. 4d.; balance in hand £763 5s. 11d.; total number of accounts which have been open since March 2, 1857, 8,370; present number of open accounts 3,763. The following shows the deposit (exclusive of sale books) and withdrawals in the four years of the Bank's existence. The shillings and pence are omitted. Deposits, 1857, £546, withdrawals, £228; 1858, £1,449; withdrawals £800; 1859, £2,040; withdrawals £1,918; 1860, £1,098,; withdrawals £1,515. The state of trade fully accounts for the falling off in the last year, and for the excess of withdrawals over deposits.

Hastings Mechanics' Institution.—At the last quarterly meeting of the above Institution, the president (Mr. C. Womersley) in the chair, a report for the last quarter was read by Mr. Joshua Huggett, the honorary secretary. It appears that during the past quarter 21 have been added to the list of members and 26 have left; the present number of subscribers is 332, including 47 ladies. The lecture season during the past year has been one of the most successful the Institution ever had. Seventeen lectures were delivered, fifteen of them being gratuitous

* See vol. viii., p. 619.

having been delivered by gentlemen of the town and neighbourhood. The attendance was decidedly better than ever before known, and on one or two occasions the lecture-room was not found sufficiently large to hold those who wished to attend. The receipts of the lectures were £21 17s. 6d., and the expenditure £23 6s. 10d., so that the average cost of each lecture was 1s. 8½d. The following is a list of the lectures and the dates when delivered:— Mrs. Balfour, Nov. 12, "Charlotte Bronte;" Mr. Pitter, Nov. 19, "Cowper's Political Works;" J. Saunders, Esq., Nov. 26, "The Inventor's Story;" G. Dawson, Esq., Dec. 5, "On Hamlet;" J. C. Savery, Esq., Dec. 10, "The Battle of Hastings;" Rev. J. H. Blake, Dec. 17, "On Great Men and Little Men;" Mr. Womersley, Jan. 14, 1861, "The Pyramids and their Story;" E. V. Harcourt, Esq., Jan. 21, "A Narrative of Personal Adventure in North Africa;" W. D. Lucas-Shadwell, Esq., Jan. 28, "Lights and Shadows of the Good Old Times;" F. North, Esq., M.P., January 30, "The Plains of Italy;" Rev. J. H. Blake, Feb. 4, "The City Arabs;" S. Sharpe, Esq., Feb. 18, "The Interpretation of Egyptian Hieroglyphics;" Rev. J. A. Hatchard, Feb. 20, "Amusements of the People;" Mr. Butler, Feb. 25, "Pneumatics;" Dr. Hunt, March 4, "The American Indians;" Rev. W. W. Robinson, March 11, "John Howard;" J. C. Savery, Esq., March 18, "Coal Gas." The following classes are in operation;—Short-hand, grammar, French, and writing. They have been as fairly attended as could be expected, considering the somewhat advanced season at which they commenced. The report says "The Society of Arts examinations present so many advantages to the students of Mechanics' Institution classes, that it is a source of regret that Hastings has not yet been represented, whilst other towns of less pretensions have sent candidates who have been successful in carrying off prizes. It is hoped that by resuming class instruction to as full an extent as possible in the ensuing autumn, members will qualify themselves to join in the annual examinations." The ordinary income of the Institution during the past year was £138 2s. 6d., and the ordinary expenditure, £119 15s. 1d. The income from all sources was £184 0s. 5d. During the past quarter 564 books have been in circulation.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Brit. Architects, 8.
Geographical, 8½. 1. Major-General Sir Henry Rawlinson, "Notes on the Direct Overland Telegraph to India." 2. Mr. C. R. Markham, "Sources of the River Purus, in South America." 3. "Despatch from Dr. Livingstone, dated 9th February, 1861, containing Dr. Kirk's Report on the Botany, &c., of the Regions of the Zambesi."
Tues. ...Syro-Egyptian, 7½. 1. Dr. Golowicz (of Kœingsberg), "Did the Egyptian Interpreters belong to the Class of Priests or not?" 2. Rev. H. B. Cowper, "On the Literature and Language of the Chaldæans in reference to the Book of Daniel."
Medical and Chirurg., 8½.
Zoological, 9.
Wed. ...Literary Fund, 3.
Meteorological, 7. Anniversary.
Microscopical, 8.
R. S. Literature, 8½.
Archæological Assoc., 8½.
Thurs...R. Soc. Club, 6.
Philological, 8.
Royal, 8½.
Antiquaries, 8½.
Fri.......Astronomical, 8.
Sat.......Asiatic, 3.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Num.

Delivered on 24th May, 1861.

233. East India (Finances, &c.)—Copy of Correspondence.
250. Slave Trade—Return.
271. Army (Roman Catholic Chaplains)—Return.
China—Memorial respecting Canton Claims.
Exhibition of 1851—4th Report of the Commissioners.
Civil Service Commissioners—6th Report.

Delivered on 25th and 27th May, 1861.

261. Shipping—Returns.
264. Law of Evidence (Colonies), East India (Law of Evidence)—Return.
260. East India—Home Accounts.
272. Commissioners of the Peace (Ireland)—Return.

Delivered on 28th May, 1861.

38 (4). Trade and Navigation Accounts—(30 April, 1861).
274. Donegal Evictions, &c.—Return.
275. Army, &c.—Account of Receipt and Expenditure.
148. Bill—Excise and Stamps—(Amended).

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, May 24th*, 1861.]

Dated 14th May, 1861.

1229. R. W. Woollcombe, Stoke, Devonshire—Imp. in projectiles and in fire-arms for discharging the same.
1230. J. J. L. Chazaren, Paris—Imps. in apparatuses for containing and drawing off beer and other malt liquor, and in drawing malt liquor from casks.
1231. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in apparatus for the manufacture of aerated waters, and in vessels or receptacles for containing the same. (A com.)
1232. J. Howard and E. T. Bousfield, Bedford—Imp. in apparatus to be employed in steam cultivation.

INVENTIONS WITH COMPLETE SPECIFICATION FILED.

1245. A. T. Watson, Middleton, Richmond, U. S.—Springs for railroad cars and for carriages, and for many other purposes for which springs are used or required.—16th May, 1861.
1256. B. Hudson, 25, Gloucester-crescent, Regent's-park—An improved machine for applying steam in a manner to cause direct rotation. (A com.)—16th May, 1861.
1279. B. F. Stevens, Trafalgar-square—"Imp. in tractomotives or engines for running upon earth on common roads. (A com.)—18th May, 1861.

[*From Gazette, May 31st*, 1861.]

Dated 27th March, 1861.

762. W. Jeffs, Manchester, and J. Pennock, Blackley, near Manchester—Imp. in steering ships or boats, and in apparatus connected therewith.

Dated 26th April, 1861.

1046. J. Lunn, G. Hiley, and J. Lisle, Huddersfield—Imp. in means or apparatus for stretching fabrics during the processes of finishing fabrics.

Dated 27th April, 1861.

1064. T. W. Miller, Portsmouth—Imp. in steam engines and apparatus connected therewith.

Dated 6th May, 1861.

1132. G. Ager, Aylsham, Norfolk—Imp. in means or apparatus for breaking or opening land.
1143. G. Coles, Gresham-street West, J. A. Jaques, J. A. Fanshawe, and T. Galpin, Tottenham, Middlesex—Imp. in ventilating various articles of wearing apparel.

Dated 7th May, 1861.

1150. W. E. Newton, 66, Chancery-lane—Improved apparatus for boiling substances and generating steam. (A com.)

Dated 10th May, 1861.

1183. T. Curtis, Livesey, near Blackburn—Imp. in the manufacture of healds.

Dated 11th May, 1861.

1201. G. F. Jones and J. Jones, York—An improved method of propelling and steering steam vessels, and for a casing about the apparatus, constituting therewith a steam condenser.

Dated 14th May, 1861.

1226. G. S. Goodall, Brighouse, Yorkshire—Imp. in wire card covering for carding tow, flax, or other fibrous substances.
1233. J. Chedgey, the Grove, Great Guildford-street, Southwark—Imp. in the manufacture of glass rollers, plungers, and pipes, applicable to pumps and other uses.

Dated 15th May, 1861.

1234. A. Whyte and M. Malcolm, Glasgow—Imp. in the manufacture of frills, ruffles, or frilled trimmings.
1235. J. Wooller, Bradford—Imp. in machinery or apparatus for drying textile fabrics and materials, which imps. are also applicable in scouring or dyeing of the said materials.
1236. W. Clark, 53, Chancery-lane—Imp. in gas regulators. (A com.
1237. E. C. Kemp, Avon-place, Pershore-road, Birmingham, and T. Hall, Basinghall-street, Leeds—Imp. in gas and other lamps.
1238. J. Riley, Hapton, near Accrington, Lancashire—Imp. in certain materials to be used in the process of dyeing and printing.
1239. W. Mitchell, Manchester—Imp. in machinery or apparatus for printing paper-hangings.

1240. H. Doulton, High-street, Lambeth—Imp. in the construction of vats and similar vessels for containing liquids.
1241. S. C. Lister and J. Warburton, Manningham, near Bradford—Imp. in spinning and treating yarns.
1243. W. Jackson, Leeds—Imp. in mortising machines.
1244. J. Hicks, Hatton-garden—An improved construction of self-registering thermometer.

Dated 16th May, 1861.

1247. C. Stevens, 31, Charing-cross—Imp. in mills. (A com.)
1248. W. R. Bowditch, Saint Andrews, Wakefield—Imp. in safety and other lamps.
1249. H. Gilbee, 4, South-street, Finsbury—An improved reaping machine, to be called "comb-beater." (A com.)
1250. A. V. Newton, 66, Chancery-lane—Imp. in knitting machinery. (A com.)
1251. G. Knight, Nottingham—Imp. in holders and cases for holding bonnet fronts, rouches, frills, and other fancy articles.
1252. C. Clay, Walton, near Wakefield—Imp. in implements for cultivating land suitable to be worked by steam or other power.
1253. D. K. Clark, 11, Adam-street, Adelphi—Imp. in furnaces.
1254. J. L. Bowhay, Modbury, Devonshire—Imp. in reaping and mowing machines.
1255. B. Hudson, 25, Gloucester-crescent, Regent's-park—Imp. in the construction of power looms. (A com.)

Dated 17th May, 1861.

1257. T. Dunn, Pendleton, Manchester—Imp. in watches and pocket timekeepers.
1258. T. Dunn, Pendleton, near Manchester—Imp. in machinery and apparatus for altering the position of locomotive engines, carriages, and goods, and preventing injury and accidents on railways.
1259. S. Tearne, Birmingham—An imp. or imps. in producing designs in enamel on articles of brass, and the alloy called German silver.
1260. S. Pitts, 14, Catherine-street, Strand—Imp. in billiard and bagatelle tables.
1261. A. Allan, Perth—Imp. in locomotive steam engines, and in buffer and draw springs for the same, and for other railway rolling stock.
1262. J. C. M. Béziat, 114, Rue Mouffetard, Paris—Improved apparatus for raising or tilting casks and other vessels or articles requiring to be tilted.
1264. A. Turner, Leicester—Imp. in the manufacture of elastic fabrics.
1265. W. Patey, jun., Lombard-street, and J. Richardson, Brewer-street, Clerkenwell—Imp. in the manufacture of brushes.
1266. W. Clark, 53, Chancery-lane—Imp. in the preparation or manufacture of artificial alizarine. (A com.)
1267. P. Ashcroft, South Eastern Railway, London-bridge Station—Imp. in railway chairs and fastenings.

Dated 18th May, 1861.

1268. W. H. Bennett, 42, Parliament-street, Westminster—Imp. in apparatus for regulating the supply of gas. (A com.)
1269. A. C. Ponton, 9, Arlington-villas, Clifton, near Bristol—Combining together silicious powder into solid masses of any form by means of sulphur, and which combination he calls siliceous stoneware.
1270. G. Neville, Birmingham—Imp. in the construction of the sacking of bedsteads and couches, and other like articles.
1271. S. L. Sotheby, 13, Wellington-street, Strand—Imp. in the bindings or coverings of books and portfolios, which imps. may be applied to dispatch boxes, ladies' work boxes, office boxes, and such like articles.
1272. W. Greaves, Portmadoc, Carnarvonshire—Imp. in machinery or apparatus for dressing slates.
1273. D. G. FitzGerald, Cambridge-street, Middlesex—Imp. in obtaining electric currents for telegraphing purposes.
1274. D. G. FitzGerald, Cambridge-street, Middlesex—Imp. in batteries for producing voltaic electricity, together with certain metallic products.
1275. J. Hughes, Newport, Monmouthshire—Imp. in plates to be used in ships and other structures for receiving armour plates or bars, and in the means of fixing such armour plates.
1277. R. King and K. Robson, Granville-street, Sheffield—Consuming and destroying smoke as emitted from engine or other chimnies, and from all other flues from which smoke is emitted.
1278. W. Clark, 53, Chancery-lane—Imp. in electric telegraph apparatus. (A com.)

Dated 20th May, 1861.

1280. W. C. Forster, 37, Gibson-street, Lambeth, Surrey—An improved method of manufacturing bricks and slabs, impervious to damp, for preventing moisture rising in pavements and the walls in houses and other buildings.
1281. G. Buckley, Salford—Imp. in the construction rollers for doubling frames and other machines.
1282. J. Sidebottom, Harewood, near Mottram, Cheshire—Imp. in cop tubes and partial tubes, and in apparatus for holding them on to the spindles of mules for spinning and doubling, also imps. in the construction of the skewers for shuttles and winding machines.
1283. J. Jobin, 2, South Island-place, Clapham-road, Surrey, and J. Weber, St. Martin's le-Grand—Imp. in the manufacture of cigars and cigarettes, and in the apparatus employed in such manufacture.
1284. W. Parkinson, Ripon, Yorkshire—Imp. in washing, wringing, and mangling machines.
1285. M. Scott, Parliament-street, Westminster—Imp. in ordnance.
1286. G. E. Donisthorpe, Leeds—Imp. in sizing, drying, and warping yarns for weaving.
1287. A. J. Robertson, 26, Parliament-street, Westminster—Imp. in the construction of ships and vessels.
1289. E. Humphrys, Deptford, Kent—Imp. in the construction of iron ships, batteries, and forts.

Dated 21st May, 1861.

1290. H. B. Barlow, Manchester—Certain imp. in looms for weaving. (A com.)
1291. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Imp. in the coupling or connecting joints of pipes for the conveyance of liquid, fluid, or solid bodies. (A com.)
1292. G. F. Griffin, New Adelphi Chambers, Adelphi—Imp. in the manufacture or construction of railway chairs and their fastenings, the latter being applicable to other purposes.
1293. W. P. Dreaper, 56, Bold-street, Liverpool—Imp. in pianofortes.
1294. Y. Parfrey, Pimlico Wheel Works, Middlesex—Imp. in the construction of carriage wheels.
1295. T. Aveling and H. Rawlinson, Rochester, Kent—Imp. in the construction of locomotive engines.
1296. W. Tasker, jun., Waterloo Iron Works, near Andover—Imp. in machinery or apparatus for tilling or cultivating land.
1297. T. Sykes and B. C. Sykes, Cleckheaton, and J. W. Crossley, Yorkshire—Imp. in boilers and furnaces.

Dated 22nd May, 1861.

1298. J. Bleasdale, Accrington, Lancashire—Imp. in the manufacture of fluted rollers for preparing and spinning fibrous materials, and in machinery for the purpose.
1301. H. B. de Beaumont, Geneva—Imp. in ploughs.
1302. G. E. Donisthorpe, Leeds—Imp. in apparatus used in getting coal.
1303. G. B. Naglost, Vienna—Imp. in cannon and projectiles to be used therewith.
1304. W. E. Newton, 66, Chancery-lane—Imp. in printing machinery. (A com.)

Invention with Complete Specification Filed.

1360. J. R. Chesnau, 39, Rue de l'Echiquier, Paris—Imp. in pen and pencil holders.—22nd May, 1861.

Patents Sealed.

[*From Gazette, May* 31*st*, 1861.]

May 31*st*.
2958. R. E. Keen.
2972. B. Greenwood.
2980. C. S. Duncan.
2983. C. W. Lancaster.
2987. G. C. Lingham and J. Nicklin.
2993. T. Mellodew, C. W. Kesselmeyer, and J. M. Worrall.
3301. J. B. Turtle.
3009. J. Robson, jun.
3011. T. Roberts.

[*From Gazette, June* 4*th*, 1861.]

June 4*th*.
2981. G. W. Hart.
2982. C. W. Siemens.
2992. M. Deavin.
2998. C. J. Hill.
2999. F. H. Edwards
3003. J. J. Wheble.
3008. G. Davies.
3012. M. Jones.
3014. J. H. Johnson.
3016. L. Simon.
3021. A. J. Filliette.
3023. J. A. Barde.
3024. W. Clark.
3027. R. Davison.
3028. R. H. Hughes.
3029. R. Hudson.
3038. J. Townsend & J. Walker.
3041. H. Tucker.
3042. T. Massey.
3058. J. G. Reynolds.
3069. C. Reeves.
3128. T. Sykes and B. C. Sykes.
3129. G. Hadfield.
316. M. J. Stark.
708. J. Franks.
909. J. Silvester.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, May* 31*st*, 1861.]

May 27*th*.
1536. P. R. Hodge.
May 28*th*.
1217. M. Henry.
1219. J. Young and J. Strang.
1232. R. W. Chandler and T. Oliver.
May 29*th*.
1439. P. M. Crane.

[*From Gazette, June* 4*th*, 1861.]

May 30*th*.
1244. J. Meiklejon.
1246. W. Clayton and J. Goodfellow.
1298. D. Moseley.
June 1*st*.
1245. R. Owen.
1247. J. Bethell.
1252. R. Owen.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, May* 31*st*, 1861.]

May 29*th*.
1226. M. Poole.

[*From Gazette, June* 4*th*, 1861.]

June 1*st*.
1224. B. O'Neale Stratford.

Journal of the Society of Arts.

FRIDAY, JUNE 14, 1861.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £415,450, have been attached to the Deed.

GUARANTEE FUND FOR THE EXHIBITION OF 1862.

The following additions have been made since the last announcement, in the *Journal* for June 7:—

** *The names marked with an asterisk are those of Members of the Society of Arts.*

Names.	Amount.	Representing the Objects of the Society—Arts, Manufactures, and Commerce.
*R. M. Jackson, 45, Piccadilly, W.	250	Commerce.
Lady Panmure, 19, Chesham-street, Belgrave-square, S.W.	500	Arts.
*Charles Lewis Gruneisen, F.R.C.S., 16, Surrey-street, Strand, W.C. ...	100	Arts.

By Order,

P. LE NEVE FOSTER, *Secretary.*

INTERNATIONAL EXHIBITION OF 1862.

Her Majesty's Commissioners have given notice, in the *Gazette* of Tuesday last, that no demands for space, either from local committees or individual exhibitors, in the United Kingdom, Isle of Man, or Channel Islands, will be received after Tuesday, the 1st of October, 1861, and that the allotment of space will then be made on the returns sent in up to that date. Where no local committees are formed, provincial applications for space will be referred to, and determined by, national or metropolitan trade committees.

Her Majesty's Commissioners have appointed the following Class Committees in addition to those already published in the *Journal*:—

For Class 17 (Surgical Instruments and Appliances), William Laurence, Esq., F.R.C.S.; Jos. H. Green, Esq., F.R.C.S.; Jas. Moncrieff Arnott, Esq., F.R.C.S.; J. Flint South, Esq., F.R.C.S.; Cæsar H. Hawkins, Esq., F.R.C.S.; Jas. Luke, Esq., F.R.C.S.; F. Seymour Haden, Esq., F.R.C.S.; Jas. Paget, Esq., F.R.C.S.

For Class 37 (Architecture), W. Tite, Esq., M.P., President of the Institute of British Architects; A. J. B. Beresford Hope, Esq.; T. L. Donaldson, Esq.; G. G. Scott, Esq., R.A.; M. Digby Wyatt, Esq.; Sydney Smirke, Esq., R.A.; James Fergusson, Esq.; and Arthur Ashpitel, Esq.

For Class 38 (Paintings in Oil and Water Colours and Drawings), Sir Chas. Eastlake, President of the Royal Academy; Sir J. Watson Gordon, R.A., President of the Royal Scottish Academy; S. Catterson Smith, Esq., President of the Royal Hibernian Academy; F. Y. Hurlstone, Esq., President of the Society of British Artists; Frederick Tayler, Esq., President of the Society of Painters in Water Colours; Henry Warren, Esq., President of the New Society of Painters in Water Colours; R. S. Lauder, Esq., R.S.A.; and Richard Redgrave, Esq., R.A.

For Class 39 (Sculpture, Models, Die-sinking, and Intaglios), the Marquis of Lansdowne, K.G.; the Earl of Gifford, M.P.; J. H. Foley, Esq., R.A.; A. H. Layard, Esq., M.P.; R. Westmacott, R.A.

For Class 40 (Etchings and Engravings), W. H. Carpenter, Esq.; D. Colnaghi, Esq.; G. T. Doo, Esq., R.A.; R. J. Lane, Esq., A.R.A.; and W. Smith, Esq.

The following Local Committees have been formed, in addition to those already published:—

Banbury.

The Mayor, President.
James Stockton, Esq., Secretary.

Chester.

The Mayor, President.
John Walker, Esq., Secretary.

Dewsbury.

J. Smith, Esq., Secretary.

Glasgow.

The Lord Provost, President.
John Kinnear, Esq., } Hon. Secretaries.
Dr. Strang, LL.D. }

Great Grimsby.

The Mayor, President.
H. M. Leppington, Esq., Secretary.

Hertford.

Philip Longmore, Esq., Secretary.

Sheffield.

The Mayor, President.
Geo. Wilson, Esq., Secretary.

Sudbury (Suffolk).

The Mayor, President.
J. T. Gooday, Esq., Secretary.

WARRINGTON.
The Mayor, President.
Thomas Geddes, Esq., Secretary.

The following arrangements, in addition to those already published, have been made in foreign countries in reference to the Exhibition:—

AUSTRIA.

The official *Wiener Zeitung*, of the 7th of June, states, that measures for the formation of a Commission, of which the Minister of Commerce will be President, are being taken, in order to facilitate and encourage Exhibitors to participate in the ensuing Exhibition.

Local Committees, assisted by the Presidents of the various Chambers of Commerce throughout the Austrian dominions, are to be formed for the purpose of stimulating the Manufacturers, and to select the articles of proposed Exhibitors.

It is further stated that every facility will be afforded by the Government lines of railway for the transmission of goods at a reduced scale of charges.

BELGIUM.

By a Royal Decree, bearing date 23rd of April, 1861, a Commission was appointed in Belgium with the view of assisting those manufacturers who purpose exhibiting their goods at the Exhibition of 1862.

Having taken into consideration that the Exhibition of 1851 cost the country the sum of 170,000 fr., though it was not open to every branch of Art which will be represented at the forthcoming Exhibition; and being fully persuaded that the Belgian Exhibitors, on the present occasion, will be much more numerous than was the case either in 1851, or even in 1855, the Commission recommended that a grant of 225,000 fr. should be applied for from the Government, to defray the necessary expenses of transport, &c. This amount was granted by Royal Decree, dated 12th May, 1861.

On the 23rd May, 1861, a circular was addressed by the Minister of the Interior to the various Chambers of Commerce throughout the kingdom, informing them of the steps that had been taken; that His Royal Highness the Duke of Brabant had graciously consented to be the President of the Commission, and requesting their cordial support in promoting the undertaking.

At the same time a circular was sent to all the principal artists in the country, inviting them to contribute a choice selection of their works, and fixing the Exhibition of Belgian Art to the works of those artists who were alive in or subsequent to 1830.

BAVARIA.

Le Comité de l'Administration Centrale de la Société Polytechnique, Munich.

HESSE DARMSTADT.

M. le Conseiller intime Eckhart, à Darmstadt, Président de l'Association industrielle du Grand Duché de Hesse.

PORTUGAL.

His Majesty, the King, Dom Fernando II., President: Counsellor Joaquim Larcher, Director-General of the Department of Commerce and Manufactures, Secretary.

TASMANIA.

W. L. Crowther, Esq., Board-room, Colonial Secretary's Office, Tasmania, Chairman.

TENTH ANNUAL CONFERENCE.—NOTICE TO INSTITUTIONS.

The Tenth Annual Conference between the Representatives of the Institutions in Union and the Council will be held on Tuesday next, the 18th inst., at half-past 10 o'clock in the morning.

Secretaries of Institutions in Union are requested to forward, as soon as possible, to the Secretary of the Society of Arts, the names of the Representatives appointed to attend the Conference, stating at the same time (if possible) whether those gentlemen will also be present at the Society's Annual Dinner, which will take place on the following day, and of which particulars are given below.

The Chairmen of, or Representatives from, the several Local Boards of Examiners are invited to attend.

The Council will lay before the Conference:—

1. The Secretary's Report of the proceedings of the Union for the past year.

2. The Programme of the Examinations for 1862.

3. The Minutes of the Meeting which, at the suggestion of the Southern Counties Education Society was held here, to establish the "Central Committee of Educational Unions, in connexion with the Society of Arts." [See *Journals* of February 22nd and April 12th.]

> *** The objects of that Committee are to promote a uniformity of standard in the Local Elementary Examinations, and to give a settled uniform value to the Local Certificates. The Council will be glad to ascertain, from the Representatives of Institutions and of the Local Boards, whether, in their opinion, those bodies are likely to be benefited by the action of the Central Committee.

4. In connexion with this subject, the Conference will be invited to consider whether it is desirable to pass any resolutions suggesting the further grouping of neighbouring Institutions in County or District Sub-Unions.

5. The Council will communicate to the Conference the Resolutions passed on the 6th of February, and published in the *Journal* of the 15th of that month, in favour of the establishment of District Museums, and the systematic circulation of interesting objects for temporary exhibition therein.

6. The Council will call attention to its recent communications with the Company of Painters' Stainers, [see *Journal* of 26th April], and will invite the Conference to consider whether any Resolutions should be passed in favour of Competitive Exhibitions of Works of Skilled Labour.

7. The Conference will be asked to consider whether arrangements should be made to enable Excursion Parties of Institutions in Union with the Society of Arts to assemble in a great gathering at the Crystal Palace, on Monday, the 26th, or Tuesday, the 27th of August, or on some other day.

8. The adjourned question, whether the Institutions can advantageously make arrangements for their members to visit the International Exhibition of 1862, will be brought forward.

9. At the last Conference it was agreed that the subject of Mr. Buckmaster's motion (of 1859), respecting the exclusion of Institutions from the Parliamentary Grants for Education, should be further discussed at the ensuing Conference.

10. The Representatives will be asked whether they desire that the Society should print and issue to the Institutions another edition of the List of Lecturers.

Notice of any other subjects which Representatives may wish to submit to the Conference, should be given to the Secretary of the Society of Arts.

ANNUAL DINNER.

The One Hundred and Seventh Anniversary Dinner of the Society will take place at the Crystal Palace, Sydenham, on Wednesday next, the 19th inst., at 5 o'clock, punctually. The Right Hon. the Earl of Elgin and Kincardine, K.T., G.C.B., will preside.

The Members and their friends will assemble in the ante-room of the Dining Hall, in the Railway-wing, at half-past four o'clock. Application for Tickets (price 10s. 6d. each) should be made to Mr. Samuel Thomas Davenport, at the Society's House. It is particularly requested that those who intend to be present will take their tickets as soon as possible in order to facilitate the arrangements.

EXAMINATIONS, 1861.

In the list of Candidates who have obtained Certificates, published in the *Journal* for May 31, a second-class certificate in Algebra is erroneously given to No. 477, William Dale, who did not come up to the Final Examination, instead of to No. 447, George Noble Withall, aged 18, of the Sussex Hall Evening Classes, Clerk, he having written a wrong number on his papers.

Also, for "No. 642, Goyne, George," read "No. 642, Goyne, John."

CHARCOAL AIR FILTERS FOR THE VENTILATION AND DISINFECTION OF SEWERS.

By John Stenhouse, LL.D., F.R.S.

When we consider that the sewers of London, pervading as they do every part of the metropolis, extend to some 1,500 miles, and that almost every house is more or less intimately connected with them, it is plain that their influence, in a sanitary point of view, cannot readily be over-estimated.

Till within the last few years, the ventilators for the sewers were reduced to as small a number as possible, and always placed in the centres of the streets, on account of the disagreeable and dangerous effluvia which, especially in warm weather, these air-holes were too apt to emit. At present, however, these air-holes may be increased to any extent, and placed in any situation; for since the application of the charcoal air-filters to the ventilating shafts of the sewers, the effluvia and deleterious gases are effectually arrested and destroyed, by being subjected to a species of low combustion, which resolves their carbon into carbonic acid, their hydrogen into water, and their nitrogen into ammonia.

The nature and origin of the charcoal air-filter is as follows. It has long been known that the various kinds of animal and vegetable charcoal, especially when dry, possess the power of absorbing effluvia, and the greater number of gases and vapours. The subject was first investigated by M. Löwitz, a German chemist, who, towards the close of the last century, showed that charcoal might be made to deodorize and disinfect most putrid substances. About seven years ago, it was discovered by Mr. John Turnbull, of Glasgow, that when the bodies of dead animals are covered over with a few inches of powdered charcoal, and exposed to the air, though the bodies rapidly decay, not the slightest disagreeable odour is evolved. This result I verified in 1853, by burying the bodies of a full-grown cat and two rats, in about two inches of charcoal powder, and keeping them in my laboratory. The bodies of the animals rapidly decayed, but not the slightest odour was perceptible, nor were any injurious consequences experienced by any of the eight or nine persons by whom the laboratory was daily frequented. Towards the close of 1853, my attention was first directed to the deodorizing and disinfecting properties of charcoal, and I was not long in discovering that the views which had been previously entertained regarding the action of charcoal were exceedingly erroneous; for instead of acting as an antiseptic, and thereby retarding the decay of putrefying substances with which it was in contact, as had been previously supposed, its action was the very reverse of this. Charcoal, therefore, from the considerable amount of condensed oxygen contained within its pores, amounting to between nine and ten volumes, not only absorbs, but rapidly oxidizes the effluvia and miasmata emitted by decaying substances, and resolves them into the simplest combinations they are capable of forming.

All porous substances, such as platinum black, pumice stone, &c., possess the power of condensing gases within their pores.

The porosity of charcoal is much greater than many persons are aware of. Liebig states, in his "Letters on Chemistry," that the pores in a cubic inch of beech-wood charcoal must, at the lowest computation, be equal to a surface of 100 square feet.

When reflecting on the wonderful power of charcoal as a deodorizer and disinfectant, as exhibited in the cases already described, where, as we have seen, a layer of charcoal not more than two inches in thickness is capable of absorbing all the miasmata from such an extensive source of corruption as the putrid body of a large animal, it struck me that a thin layer of charcoal powder interposed between wire gauze would be equally effective in preventing the noxious effects which too frequently result from the very minute quantity of putrid infectious matter floating in the air of what are generally known as unhealthy situations.

These considerations led me to construct the so-called charcoal air-filter for the purification of the atmosphere, which was first publicly exhibited and described by me at the meeting of the Society of Arts, on the 22nd of February, 1854.*

The charcoal air-filter consists of a layer of charcoal in coarse powder, varying in size, according to circumstances, between a small bean and a filbert. The charcoal is placed between two sheets of wire gauze fixed in a frame, and can be readily applied to buildings, to ships, to the air-shafts of sewers, to water-closets, to respirators, and various other purposes. All the impurities in the air are absorbed by the charcoal, so that a current of pure air alone passes through the filter, and in this way pure air may be obtained from exceedingly impure sources. It is plain that perforated zinc, or a framework of coarse wire filled with larger pieces, and a greater thickness of charcoal, may be also employed, whenever the amount of effluvia evolved is very considerable.

Before the close of the year 1854, air-filters or charcoal ventilators were fitted up both at the Mansion House and Guildhall. They are each of them several feet in diameter, the layer of charcoal being about one-and-a-half inch in thickness. Although six years have elapsed, the charcoal has never required to be renewed, owing to its oxidating power being practically unlimited. Air-filters were soon afterwards largely employed in private houses, in connexion with drains and water-closets particularly, and they were also very successfully applied to the construction of respirators, many thousands of which have ever since been annually manufactured. On the 2nd of March, 1855, I delivered a lecture at the Royal Institution, on the Economical Application of Charcoal to Sanitary Purposes. It was subsequently published by Churchill, and passed through three editions. In it, the preceding and many additional facts were made known to the public.

Some time after the publication of this lecture, Mr.

* See *Journal*, vol. ii., p. 245.

Robert Rawlinson, the eminent engineer, was induced to apply the charcoal filter, in the beginning of the year 1856, to the air-shafts of sewers. The charcoal filters are so arranged, that while the charcoal is kept dry, the whole of the air issuing from the sewer is made to pass through the charcoal, by which all its impurities are retained and destroyed, nothing but pure air passing up into the street. From the extreme porosity of the charcoal it does not sensibly injure the draught of the air-shafts, and by increasing the size of the filters—for instance, by doubling their diameter, or what is perhaps much better, by adding to their number—any diminution of air-way may be easily prevented. These filters, from their simplicity, are by no means costly in their construction, and if kept dry, the charcoal never requires to be renewed.

Mr. Rawlinson has hitherto employed tolerably thick single filters placed perpendicularly. I should prefer using two or more thin filters placed at short distances, say two inches, from each other. These thin filters disinfect the air quite as efficiently as a single thick one, and I think they present rather less obstruction to the air. There is this disadvantage also attending the use of the upright filters, that after a time the charcoal is apt to subside a little, and leave an opening at the top, through which a portion of the air may escape. This, however, is easily prevented by placing a bar of wood or metal, from two to three inches broad, right across the upper part of the outside of the filter. When this has been done, even should the charcoal subside for an inch or so at the top of the filter, no air will be able to pass through which has not been disinfected by the charcoal.

Mr. Rawlinson, during the last four years, has applied charcoal air-filters to the ventilation of sewers on a large scale, at West Ham, near London; at Swansea, Worksop, and Buxton, the entire towns; at Brighton partially; at Bowood, the seat of Lord Lansdowne, and at various other places.

In 1858 a very important and able report on the state of the sewers, and the various means which have been proposed for disinfecting them, was published by Dr. Letheby, Health Officer of the City of London, and Lecturer on Chemistry and Medical Jurisprudence in the Medical College of the London Hospital. After a minute and rigorous examination of the various methods proposed for disinfecting the sewers of London, some of which were enormously expensive, those with bleaching powder and permanganate of soda being estimated to cost from 200,000 to 270,000 pounds for a single year, Dr. Letheby strongly recommended the employment of charcoal air-filters, as infinitely the cheapest and most effective of all the plans which had been proposed. About a year ago, therefore, under Dr. Letheby's directions, Mr. Haywood, the engineer to the City Commissioners of Sewers, commenced applying the charcoal filters to the ventilation of the sewers in Shoreditch, and to many of the adjoining streets, which were well known to suffer more from the sewerage exhalations than almost any of the other districts in London. Mr. Haywood employed tolerably thin horizontal charcoal filters, three or four being placed one above the other on a stalk, with short distances between them, the pieces of charcoal being from one inch to an inch-and-a-half in length, and placed in single layers, while Mr. Rawlinson, as already mentioned, employed single perpendicular filters. In both cases the results have been perfectly satisfactory, as the sewer gases are as effectually destroyed by being subjected to a species of low combustion, as if they had been passed through a red-hot furnace. In this process the charcoal is not acted upon by the gases, but acts upon them, as before stated, causing them to combine with condensed oxygen. The efficiency of the charcoal appears never to diminish, if it is kept dry and its pores are not choked up by dust.

The expense of applying charcoal to the disinfection of the sewers is by no means considerable, as the first outlay is all that is required. I am informed that the changes rendered necessary by the introduction of charcoal ventilators for the sewers in the extensive district of Shoreditch, have been under £1,000. But had these sewers been originally constructed with a view to the employment of the charcoal ventilators, the expense would have been considerably less.

One great advantage of the charcoal system is, that it enables us to make as many openings into the sewers as we please, and thus prevents any considerable quantity of the gases accumulating at any one point, as they pass up into the filters and are destroyed almost as rapidly as they are formed. Such sewers have, therefore, all the advantages of open drains, without any of their disadvantages. Hence there can never be any considerable pressure on the traps of the house-drains, one of the great disadvantages attendant on the ordinary system of sewers. It is by no means indispensably necessary that the charcoal filters should be placed only in the ventilating shafts of the sewers. The air-holes in the centre of the streets may be closed, if thought desirable, and the gases conducted by means of wide pipes into charcoal filters, placed at the edges of the pavement, or inserted into the walls of the houses. The lower portions of the lamp-posts enlarged for this purpose, or short pillars, like letter-boxes, either standing at the edges of the pavement, or inserted into the walls of the houses, will answer perfectly well. The only precautions to be observed are, that while the filters shall be sheltered from rain and moisture, free access shall be given to the air.

In conclusion I may state, that for the last six years I have strongly recommended that charcoal air-filters should be applied to all house-drains, sinks, and water-closets.

Special Application of the Filters to Water-closets.

Every water-closet, in my opinion, ought to be furnished with a subsidiary pipe branching off from the main pipe, a little below the valve of the closet. This subsidiary pipe should be carried a few feet above the seat of the closet; and its extremity, which should be open, with the exception of a few wires stretched across it, merely to prevent the charcoal falling into it, should terminate in a charcoal filter six or eight inches thick, into which it should penetrate to the depth of two or three inches, so as, in fact, to be enclosed by a good body of charcoal. Under such an arrangement as this, no foul gases can penetrate into the closet, but will be retained and destroyed by the charcoal, into which they naturally flow, as in this direction scarcely any resistance is offered to their passage; whereas, in almost all water-closets as hitherto constructed every time that the handle is drawn up, the water which descends necessarily forces a quantity of foul air into the closet, and this foul air not unfrequently passes from the closet into the other apartments of the house.

From the preceding statements it is plain, that the oxygen contained in the air of the atmosphere is by far the cheapest and most effective deodorizing and disinfecting agent with which we are acquainted, and that the usefulness of the charcoal air-filter consists in its affording a safe and advantageous means of applying atmospheric air to disinfecting purposes.

I think it but justice to myself to state that I have no pecuniary interest in the charcoal air-filter. Though strongly urged to do so, I refrained from securing it by patent, on the ground that inventions for the prevention of disease and death ought to be sold at the lowest possible price; and should not, therefore, be encumbered with the expense and restrictions attendant upon patent rights.

Dr. Letheby, in a letter to Dr. Stenhouse, dated Dec. 11, 1860, says:—In reply to your question, as to the efficacy of the charcoal ventilators which have been put down in the City of London for the ventilation of the sewers, I can give you a satisfactory account as far as our experience has yet gone.

As you are aware, in my report on the Ventilation of Sewers, in September, 1858, I recommended that an expe-

riment should be tried on a large scale with the charcoal, as a means of destroying the noxious gases which, in their passage from the sewers into the public way, were so constantly a source of annoyance and danger. Relying on the practical facts which you had already made public, as to the powerful disinfecting action of charcoal, I had no hesitation in recommending its use to the Commissioners of Sewers of this City. Acting on this advice, their engineer, Mr. Haywood, put a large district of the City under treatment. He selected the worst district in his jurisdiction, namely, the eastern division of the metropolis; a locality densely populated and inhabited by a very poor class of persons. The area of the experiment is about fifty acres; it has about seventeen hundred houses and 14,500 inhabitants. It is completely isolated, and every opening for ventilation has been provided with a charcoal air-filter. In this way 103 filters have been put down; and although the sewage of the district is extremely bad, yet no unpleasant effects have been observed, either in the atmosphere of the sewers or on the outside of the ventilators. No hindrance has been offered to ventilation, so that the men can enter the sewers as usual, and the air-filters have completely arrested the flow outwards of the foul gases, so that no offence or annoyance is now observed, except at the gully openings, which have not been provided with charcoal filters. The experiment has been progressing during the whole of the last summer; and although the season has not been so warm as usual, yet the results are sufficiently satisfactory to warrant us in expecting the most complete success.

I may further add, that one of the charcoal ventilators was put up about two years ago, in a locality where the escape of the sewer gases had been the source of great annoyance and injury to health; and notwithstanding that it has been in action for two years, yet it is still as perfect as ever; nothing having been done to it during the whole of that time. It has acted most efficiently in the destruction of the noxious gases.

I am of opinion, from all this, that the employment of your charcoal air-filters will be found of the greatest service in every large town where the sewers must be ventilated.

Mr. William Haywood, Engineer to the City of London Commissioners of Sewers gives a similarly favourable opinion.

Mr. Robert Rawlinson, C.E., says:—I have applied this mode of sewer ventilation on a large scale at West Ham, near London; at Worksop, at Swansea, and at Buxton, (the entire towns); at Brighton partially; at Bowood, the seat of Lord Lansdowne, and at other places. I shall never, in future, execute any sewers or drains without the intervention of charcoal-boxes to burn off the gases at the points of outlet.

The entire system of sewers in Worksop is fully ventilated by special arrangements for this purpose, at fifty-one places, and these include all upper ends of sewers.

There are side-chambers having screens of charcoal intervening, through which any sewer gases must unceasingly flow; and Dr. Stenhouse has proved that such gases are oxidized by contact with the charcoal, so as to render them innoxious.

The process is silently carried on, continuously, and at very little cost. A few shillings per annum to renew any charcoal which has become wet, and to cleanse out the ventilating shafts from road dirt, which may have worked through the surface grates, by the road traffic above, is all that will be required.

Up to this time, I have put in use upwards of four hundred charcoal ventilators in sewers executed, and shall continue to use them in future. No sewer should be allowed to be without adequate means for ventilation, and most certainly no ventilator should be without the arrangement of charcoal proposed by Dr. Stenhouse.

ACCLIMATISATION OF THE ALPACA AND VICUNA IN AUSTRALIA.

The following are extracts from letters from Mr. Charles Ledger to his brother in this country, who, it will be remembered, read a paper before the Society on this subject*:—

Sydney, March 15th, 1861.

In continuation of my last, and redeeming the promise then given, I at once give you some information respecting the alpaca, llama, &c. You must bear in mind that I only write from my own experiences, conjectures, &c.

All writers on the alpaca are unanimous in asserting that the cross between the alpaca and llama is a mule, or non-reproducing animal. I maintain that it is a class of the same species, in the same degree, as Cotswold's, Southdowns, merinos, &c., in sheep. The error of the theory as to the sterility of the cross breed, and its being a barren animal, I set at rest, to my own satisfaction, so far back as 1848. I have at the present time, in the flock imported by me, a large number of animals in 1st, 2nd, 3rd, 4th, and 5th cross.

1st,	from female Llama and male Alpaca, both pure in their class.			
2nd,	,,	product of above and male Alpaca.		
3rd,	,,	,,	of 2nd cross and	,,
4th,	,,	,,	of 3rd ,,	,,
5th,	,,	,,	of 4th ,,	,,

I have not a single entire Llama in the flocks, neither have I ever had. All cross-bred males I have "cut" before attaining the age of six months.

The word "machorra" is half-Spanish, half-Imarra (Indian), derived from *Macho*, Spanish for male, and *Horra*, Ymarra for barren, contracted into "machorra," and meaning "barren as a male."

In many parts of Peru, I may say in all the cities of the coast, the word "machorra" is applied to llamas in general. "See the machorras!" "Machorras are passing!" "I met a flock of machorras!" is well known to refer to llamas. A barren mare, cow, sow, ewe, or even woman, is generally (perhaps vulgarly) called a "machorra" by the Spanish Peruvians, and "horra" by the Indians. The verse that Walton quotes, at page 29, in apparent holding of what he advances, is foreign to the question, and refers to another subject. Its translation is literally as follows, "And his barren ewes come to fruitfulness, by which his gains are doubled." If, then, as here stated, the "machorras" become fruitful, the theory of Walton, by his own illustration, must fall through. Cervantes, in his "Galatea," sings songs in praise of the fruitfulness of the pastures he is speaking of, extols their abundance, and perhaps exaggeratedly claims for them a prolific effect. It is nothing new, either, to find in all animal nature that change of climate, food, and locale, often produces fertility after a lengthened period of sterility. There are several other points sustained by Walton in which I cannot agree with him, although I fully agree that he only reproduces the opinions of writers prior to himself. His work is a useful one, and did much good in its day. Turn to page 144, and laugh at what is there said. Is it possible, I ask as I often did myself years ago, on hearing so generally sustained the opinion there stated as to the extreme difficulty of procreation in the Alpaca and Llama, can all-wise and provident nature have been deficient in this single item of her wonderful creation? I thoroughly deny the truth of such an absurd assertion; my own experience proves the contrary.

* * * * * *

The successful acclimatisation of the alpaca and llama in New South Wales is now placed beyond a doubt; a few more years of careful and devoted dedication to their proper crossing until every trace of the llama is eradicated, will open up a fecund and most valuable, permanent, and increasing source of wealth to this country. I cannot here omit calling your attention to what I consider of importance and well worthy the attention of the

* See present vol. of *Journal*, p. 212.

Society of Acclimatisation, the Government, and people of India. The proximity and easy short communication between Australia and India is well-known; and, by what I read, there are many parts of that country in every way suited to this animal. In the Presidency of Madras, I find that "Ootacamund is 7,000 feet high, the hills and level table lands are covered with short, sweet grass, mixed with heath and thyme, also Alpine gentian, which affords the best possible pasturage for the sheep and cattle of the Todahs. The range of temperature is from 25 to 69, and the mean annual temperature 56 of Fahrenheit," (see *Household Words*, March 20th, 1858, page 18, 19, of vol. 17,) the same temperature as in the largest alpaca wool producing provinces of Peru, and the climate, productions and people seem identical. How easy it would be to introduce the alpaca from this country to India, and indeed, I am certain, the idea is worthy of being entertained by the Government, a company, or a private individual. Let the experiment be made with, say 12, or 10 females and 2 males; I am sure the Government here would not object to my disposing of that number for such object; what immense results might not this small beginning lead to, and what great advantages might not Australia reap in course of time from interchange of males and reciprocal information as to the animal itself. Our late governor, Sir William Denison, is the present governor at Madras; he took a lively interest in the introduction of the alpaca here, as in everything else that promised to be of use to the colony. I will write to him on the subject. In the meanwhile I think you might bring the suggestion before the Society of Acclimatisation, the public, and individuals. There would be no necessity for any great expense; I offer most willingly to supply the animals, (with permission of Government, of course), select those fitted for the journey, attend their shipment, and further send some one in charge of them. I, too, would readily furnish all and every information on the subject, being only too proud of the opportunity of being useful to my fellow creatures. Were it thought desirable for me personally to accompany the animals and see the country, I would do so with alacrity.

It was my intention to have presented myself before the public as author of Twenty-four Years Residence in South Australia, and a Narrative of the Alpaca Expeditions. After much thought, I am afraid to venture on carrying out my first intention, the subject is too vast, and one that I am aware is beyond my capabilities, unless I were content to satisfy myself with the meagre, superficial and erroneous conclusions arrived at by every writer I have read respecting the country, people, their customs, Government, &c., &c. This I would not do. I therefore will confine myself to writing out from journals a "narrative of the alpaca enterprise," adding a few chapters on the animal, its breeding, &c., accompanying the sketches that I have, taken by Mr. Savage during the journey, with portrait of self, Mr. Savage, and my famous Pedro. The last of my men are now returning home, after 7 to 8 years of most faithful and exemplary attachment to me. Without them I could never have carried out my project, under strong temptations of pecuniary reward, the immediate possession of my flock, mules and baggage by the Bolivian authorities, if would desert from my service; which had they done, I should have been forced to abandon the expedition, had I succeeded in escaping from being killed by them, or delivered up to my persecutors; either one or the other would have been easily done had they been induced to the first step. I cannot express my feelings adequately on this subject, and I lament more and more that I am unable to in any way requite as I ought, and would desire to do, their unflinching courage, cheerful endurance of hunger, thirst, cold, inclement weather, risk of life on many occasions, their devotedness to me, and finally their readiness to leave their own country with a "White Man" akin, as European and stranger, to the hated conqueror and destroyer of their race, their traditions, and their ever-lamented and well-cherished (in traditional remembrance) Yncas.

Indeed, the readiness to accompany me is without precedent in South America, and called forth the surprise of all Europeans, on the West Coast, in anyway acquainted with the character of the Indians, in greater degree than my successfully shipping the animals. The poor fellows are anxious to see again all that are near and dear to them; they long to return to their mountain homes, and be among their kindred, and those speaking their language, holding their habits and customs, and they are right. I am pleased to see them so, although sorry to lose them after so many years being with me. They have been frugal and economical, have saved a large sum (for them) out of their wages, some of them have £60, £50, and £40. I am sadly afraid they will meet with persecution on their return, from the minor authorities of their districts for their faithfulness to me. In fact, of those that went home last year, some had been impressed as soldiers on arriving, and the others had to purchase their freedom by bribing the authorities not to molest them.

* * * * * *

I know too well the folly of believing any word of the theory obtained from the Indians. It is their glory to deceive the "White Man," the lesson they learn from birth.

The Indian of Peru acts on tradition, and will admit of no innovation in his treatment of this animal. I should have most willingly, for sake of peace, have accepted his traditions as authoritative facts, had I not been forced to change my tactics by every Peruvian Indian leaving me in disgust, thoroughly satisfied that I was conducting my flock to certain destruction by my management of them, compelled thereto by circumstances beyond his comprehension. He could not understand the necessity of my hasty driving, neither could he admit the obligatory ramble through a country all but barren, or allow for a moment that any specifics but those used by his forefathers could possibly avail in the cure of disease; perhaps the greatest difficulty I had to surmount in prosecuting my enterprise (the want of money at times being only greater) was the continued clashing of my orders with their superstitious veneration for their prejudices."

* * * * * *

The vicuna has a lamb to male white alpaca—a beautiful little thing it is, a curiosity in Natural History.

The animals are all thriving well, and giving rise thereby to unlimited hopes. The future, I feel confident, will make amends for the past.

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS.

(*Continued from page* 225.)

Exports of the Republic of Honduras. — Horned cattle is, next to mineral produce, the greatest staple of Honduras, and a large trade is carried on every year with Guatemala, Salvador, and Belize. Exclusive of the large herds which are driven directly to the markets of those States, and of the exportations to Belize, there are at least 12,000 head of cattle taken every year to the three fairs held at San Miguel, in the months of February, May, and November, which are there sold at prices averaging eight or ten dollars a-head. However, in the year 1855, as I have said, no cattle was taken to those States by reason of the revolution; and, in the November fair, owing to this circumstance, the cash returned only to Guatemala, uninvested, amounted to no less than 80,000 dollars.

Mahogany ranks third in the exportations, and there are years in which the value of this article far exceeds that of the others. The cuttings are chiefly established on the valleys bordering on most of the large streams flowing through the departments of Santa Barbara and Yoro. On these streams the logs are floated down to their mouths, where they are shipped to England in vessels from 400 to 800 tons. As the cuttings lie mostly in the lands of the State, contracts are entered into by the cutters with the Government, wherein they stipulate to pay the

revenue a certain sum for every tree that is felled, generally from five to ten dollars. The labourers are chiefly Negroes and Indians, divided into gangs of fifteen to thirty each, and the trees are generally cut at twelve feet from the ground. The season for cutting commences in August, and lasts until winter sets in, previous to which the stumps are counted by the Government officials, setting a mark on each, when it is seen how far the cutters have gone, and the adjustment of accounts take place. There are, besides mahogany, many other precious woods in Honduras, but of those only the rosewood is exported to a limited extent.

Tobacco.—The tobacco of Honduras is by far the best in Central America, and it is cultivated chiefly in Gracias, where it is produced of a quality fully equal to that of Cuba. To this island a considerable quantity is taken every year, where it is manufactured and exported as the produce of that country. The Department of Gracias carries on a large trade with Guatemala and Salvador in this article, but it is impossible to estimate the yearly value of it, depending mainly, as it does, on the state of public tranquillity and that of the political relations with these States. A large quantity is also exported every year to Germany and other places, *viâ* the Pacific, but it is alike impossible to learn its amount, as, indeed, it is of all the commerce which flows in that direction, from the circumstance of that custom-house being in the hands of private parties.

The cultivation of indigo has been introduced of late years in Gracias, in the valley of the Chamelecon River, and in the western part of the Department of Comayagua, with very favourable results, it having been found to equal, in every point, the best produced in Salvador. Its production, however, is as yet very confined, although there is no doubt that in the course of time this article will form one of the chief items of exportation.

Cocoa and coffee are cultivated in Honduras, both of them of very good quality, and the first article particularly, is quite equal to the best produced in Nicaragua. Their production, however, is not even sufficient for the home consumption, and consequently a great portion of the supplies of these articles is brought respectively from Nicaragua and Costa Rica.

Mines and Mining in the Republic of Honduras.—Although mines constitute the principal source of wealth in this Republic, little can be said on this topic, owing to the want of any statistical information, and to the neglected state in which this, as well as every other other branch of industry, has been suffered to remain. There is no doubt that when a development of the latent resources of Honduras begins to take place, mining will be the most interesting and important pursuit on account of the abundance and richness of the metalliferous veins which are found in various parts of her territory. The amount of the mineral products of Honduras may be estimated at from 200,000 to 300,000 dollars worth a year. As there is no tax levied on the exportation of the precious metals, it is not possible to ascertain the exact value it amounts to, but I think the above figure is the most approximate estimate of the annual average value of these products, all of which are taken out of the country, there being no Mint in the State, and the use of gold and silver wrought articles being very inconsiderable. In the latter times of the Spanish dominion, the mines yielded, according to the best authorities, on an average, from two to three millions of dollars a year. This productiveness was the result of the state of quiet which was enjoyed then, but since the emancipation from Spain the long series of revolutions which have devastated this country have been gradually diminishing the importance of mining, until it has dwindled to the comparatively insignificant state in which it is at present found, a condition which has been brought about solely by the agency of war, seeing that all the mineral districts are, with the exception of a few old mines which have been worked out, in a virgin state. Even as it is, the precious metals constitute, as I have said before, the principal item in the exportations of this country; although, as may be supposed, the system by which this produce is raised, without proper machines for draining the mines, or for extracting, crushing, and reducing the ores, is a very rude and defective one. There is a multitude of mines of acknowledged richness lying in an abandoned state from the inability of the inhabitants to work them, whereas, if operations were to be established on a judicious and proper plan, they might be made to yield large profits. Properly speaking, there are few gold mines in Honduras as yet discovered, but gold occurs abundantly in some of the rich silver mines, in most of which, in fact, the silver is found in combination with gold, iron, lead, zinc, antimony, mercury, sulphur, &c. Most of these mines are situated along the chains of mountains which lie on the Pacific slope, while gold dust and some gold mines are to be found on the Atlantic side.

Gold, according to all accounts, is found in great quantity, and of the best description, in the beds of all the rivers which flow into the Atlantic, and the washings in these *placers* are represented to be highly remunerative. Men and women employ themselves during certain portions of the year in gold washing, and they sell the gold dust at from 11·50 to 12 dollars the ounce. By far the greatest quantity of the gold exported from Honduras is raised in this way, from the rivers Guayape, Jalan, and Manguile, in the Department of Olancho, where it is found of the purest and most excellent quality, as likewise in those of Yaguale, Sulaco, Pacaya, and Caimito rapids in Yoro. Minas de Oro, a village on the northern part of the Department of Comayagua, is, as its name implies, situated in a particularly auriferous district, the precious metal being found not only in veins of a very rich character, but also in beds and fragmentary deposits along a number of streamlets and small rapids flowing into the Sulaco River. In this district are situated the copper mines which furnish all the metal used for the mintage of the "provisional" currency, and gold is here also found to exist in a considerable proportion, as has been found by washing the dust obtained in the process of bruising the copper ores. There are also some very rich copper mines in the Department of Santa Barbara, and a wealthy and intelligent native is about to establish operations for working them, with a view of exporting the metal, a scheme for which the proximity of the rivers Sulaco and Humuay offers great advantages, both running to the Ullua River, which discharges in the Atlantic a few miles from the Port of Omoa. There are also some rich copper mines in the Department of Choluteca, situated near the ridge of mountains running along the coast, a circumstance very favourable to their exploration.

Opals form another important item of the Honduras mineral riches; there are a great number of mines in the Department of Gracias, and many of these precious stones are exported every year, the value of which is, nevertheless, inconsiderable, from their being sent in their rough state. There is, however, a French miner and lapidary working a mine at Erandique, who is reported to be realising a large fortune by exporting polished opals.

Iron ores are also abundant; but only one or two mines are being worked at present, and the little iron produced is scarcely sufficient for the home demand. The following metals and minerals are found in the State:—Coal, limestone, platina, zinc, tin, amianthus, cinnabar, &c., but as yet nothing has been done to bring about a proper exploration of these riches. The arts of peace being all but ignored in Honduras, the precious metals have absorbed all the atention of those that have devoted themselves to mining pursuits. The Government has at various times tried to give a stimulus to mining by securing certain privileges to persons engaged in this branch of industry. By a decree dated March 16th, 1843, mine proprietors were allowed to work their mines as they thought best, thus abolishing the old restrictive Spanish law which enjoined mining operations to be conducted on a given and unprofitable method. Decrees have at various times been

passed, exempting men engaged as miners from military service. These laws have worked out very well in times of peace, but the moment a revolution breaks out, they are invariably disregarded by the military authorities. In consequence of the insecurity arising from these perpetual wars and other drawbacks, such as the scarcity of labourers, the want of capital and scientific appliances, the natural indolence of the Spanish American race, and the total want of roads for the conveyance of machinery adapted for the proper working of the mines, most of the enterprises which have been established, involving an outlay, have met with signal failure; in some of these, foreigners have been engaged, and foreign capital invested; but at present all the mining is in the hands of the natives, with two or three exceptions; one of them, the Cuyal mine, situated at a few leagues from the Pacific, is worked under an association formed in London, called the Cuyal Mining Company; but as yet the operations in it cannot be said to have been properly established. From the richness of the mine (yielding from 70 to 3,245 ounces of silver per ton) and its local advantages, this undertaking, if properly followed up, will no doubt turn out a very profitable one. There is another mine in Tegueigalpa, called Guasueuran, worked by an Englishman, which yields the enormous proportion of from 200 to 8,000 ounces of silver per ton.

Copper Mines.—Copper mines, which are numerous and rich in the State of Sinaloa, Mexico, have hitherto but slightly attracted the attention of British capitalists. Although for some years past Mazatlan copper has been known in the English market, until lately no steps have been taken to ascertain, by local investigation, what facilities there were to increase the supply. The district of country in which copper mining is carried on has lately been visited by professional Englishmen, having a technical and practical knowledge of the subject, and their report is exceedingly favourable, both with respect to the number of mines met with, the description and richness of the metal, and the facilities for working it; the latter is greatly aided by the different classes of ore obtainable, which, combined, assist each other in the smelting process, and a suitable flux has also been found near the copper-mines examined. The principal mine now worked is that of "Jesus Maria." The smelting has hitherto been carried on in a primitive manner, in small ovens, supplied with bellows moved by men. The copper left in the slags, through imperfect reduction, is estimated at ten to twelve per cent. The lode is described as very rich, and from twenty to thirty yards wide. At the period of the visit of the persons alluded to, about 2,500 tons of ore were ready for smelting, of an average richness of thirty per cent., and in another part of the works about 1,000 tons of sixty to seventy per cent. ore were visible; the latter was composed of grey ore, with large spots of native copper, and black oxide, and some crystals of the red oxide; the other portion of the ore was found to contain green carbonate, sulphurets of copper mixed with iron ore, and some crystallizations of sulphate of copper in the rich brown copper; the whole lode may average from fifteen to eighteen per cent. The other mines examined in the same range of the Sierra, though they vary in quality, present the same characteristic appearance as the one described. The principal drawback to the working of the copper-mines in this district is their distance from the coast, and expensive mule carriage being incurred in transporting the copper thither, the distance being about fifty-five leagues, and the expense of mule-hire two dollars to two and a-quarter dollars per quintal. Nevertheless, if the present rude operations give returns sufficiently encouraging to induce the proprietors to continue working the mines, it appears a fair subject for the consideration of capitalists whether the application of the improved methods of smelting and refining practised at Swansea, would be attended with results sufficiently profitable to warrant the investment of the capital necessary for the erection in this country of suitable smelting works, and of sending out a staff of English miners to direct them. The facility of shipping the copper to Great Britain is very great—the vessels which load Lima wood readily receiving it for ballast. The rate lately paid has been 40s. sterling per ton.

Home Correspondence.

THE NATIONAL PORTRAIT GALLERY.

Sir,—The Society of Arts is now stirring to promote the extension of Art-galleries, Museums, and Libraries. I therefore address myself to you on the subject of the National Portrait Gallery, with the assurance that through your *Journal* a large class of interested and influential readers may be reached.

Great interest has always been felt in the success of this Gallery, and the expectations of the public have been fed by paragraphs sent the round of the press, announcing, rather ostentatiously, from time to time, valuable acquisitions by gift or purchase. These I had long been anxious to see, when, stimulated by a recent perusal of Lord Stanhope's speech in 1856, which led to the formation of the Gallery, and the announcement in the newspapers that the Gallery would be open during the great holiday week, I determined to be among the crowd on Whit-Monday, and after a long walk on the morning of that day, I wandered up and down Great George-street to find this National Institution, but in vain. On a closer examination, however, I discovered on the door-post of a house, having, in every respect, the appearance of a private dwelling, a small, a very small, bell-plate, with the announcement, in Lilliputian letters, that "The National Portrait Gallery is open only on Wednesdays and Saturdays after 12 o'clock." After some hesitation, on venturing to ring the bell, I was civilly informed that Whitsuntide made no difference, but that I should find the Gallery open as announced, on Wednesday.

I was disappointed, I own, and I took some pains to renew my visit on the day appointed. This time I found a moveable board hung upon the railings, stating that the Gallery was open from 12 o'clock to 4 o'clock, free. The door was thrown open, a policeman was at the entrance, a *commissionaire* received my umbrella in one hall, a second policeman on the first-floor pointed out the room I was to enter, and a clerk in the room asked me to add my name to his bare list. On the dark landing of the back and front staircase, and in three small, low, dark, unsuitable, ill-arranged rooms, I saw the results of four years' money and labour in the establishment of our National Gallery for British Portraits.

It was the middle of a fine day in the great holiday week, and I made the fourth visitor in the Gallery, so we were provided each with an attendant. This, then, at a glance was the institution which was "to afford not only great pleasure, but much instruction to the industrious classes;" which was, also, "in a special degree to be a boon to men of letters," and, continuing to quote Lord Stanhope, "an additional incentive to honourable emulation in the performance of great deeds." And all this it should be, and may still be; yet anything more slow, dull, hopeless, and depressing for a young public institution than this exhibition in Great George-street, can hardly be conceived.

On looking into the contents of our intended British Pantheon, matters did not improve. Reckoning paintings, drawings, miniatures, and busts, about 122 works are exhibited, the majority of them quite invisible to minute examination and criticism. Of their art value, some opinion may be formed by the information labelled upon the frames of about one-third (it is difficult to be more exact, as some in high and dark corners are illegible) that the artist is unknown. Perhaps ten could not be selected with much pretension to be classed as works of art. Nor is the whole collection on a much higher scale, as representing persons

of great historic interest or celebrity. The most select works appear to be hung in the front room, which is the most spacious, and has the best light; and of the thirty-five pictures which this room contains (excepting the Chandos Shakspeare portrait), looking at them with an eye to Christie's present high hammer prices, £10 each would be a very liberal average of what they would fetch, even if they are correctly named, which seems open in some instances to much doubt. By lists hung up in the rooms, there have been 36 donors, some of whom have given more than one portrait to the collection, so that about 80 works such as I have described have been acquired by purchase since 1856. I speak with sufficient accuracy; I would have been more exact, but it seemed too bad to submit to the exaction of one shilling and sixpence, demanded in a public gallery, for a catalogue of only 120 works, and I mention this as one significant fact of unfit and inefficient management.

This was all disheartening and dispiriting enough, and I grieved over the short-sightedness of "John Bull," who has the character of holding tight his purse-strings when such luxuries as pictures and public galleries are in question. I feared, from appearances, that even the £500 per annum, with which Lord Stanhope proposed to carry out his excellent idea, had not always been granted. I found out, however, on further inquiry, my great mistake, and that the sad shortcomings I had witnessed could not be attributed to public parsimony. In the Civil Service Estimates, 1861-2, class 4, Education, Science, and Art, No. 13, a vote of £2,000 is proposed for the British Historical Portrait Gallery, unaccompanied by the slightest information of any kind whatever, except incidentally the important fact, that a similar sum was voted for the previous year; and in striking contrast to this unexplained demand, there appears in the same document the votes for the National Gallery, the Kensington Museum, and the British Museum, accompanied by the most detailed estimates of salaries, wages, and purchases of every class and kind, with reports of the progress of these really great national institutions, the numbers of their visitors, students, and, in fact, everything that the Parliament or the public would desire to know.

A few calculations soon showed why it was prudent that all such knowledge should be withheld in respect to the National Portrait Gallery; what amount of advantage the public receive from it; in what way the large votes made for its support are expended; why, in fact, "no questions should be asked." As is announced, the gallery is open to the public from 12 to 4 o'clock on two days in each week. Assuming that it is closed for six weeks in the vacation season, the public are then admitted for 368 hours only in the year, which, calculated on the sum of £2,000 voted, costs the public £5 10s. per hour; and, as the result of my experience would give an average of about 5 persons per hour, or twenty per day, which I believe to be a full average, then John Bull, whom I was too prone to blame, most liberally votes about 20s. for each visitor, and each visitor pays one shilling and sixpence for his catalogue, if he desires to avail himself of its instructional advantages. This is costly inspiration in art and patriotism to be provided at the public charge. Then, as to the value of the collection which has been made. Can any competent person be found who (omitting the donations) would estimate it at one-third the money voted for the maintenance of the Gallery in the two last years only?

Extraordinary as these statements may appear, I fear that they approach very near to the truth. With the greatest interest in Lord Stanhope's great project, I have looked at the gallery with no prejudiced eye, and do not believe at the time under any dyspeptic influences. If the facts here assumed, in the absence of any due official information, are incorrect, such information can be, and should be, at once given on sufficient authority, that they may be refuted. This is due to the public. The opinions must be taken for what they are anonymously worth, but they would prove on further investigation by no means singular or unsupported.

Then the question arises still, in the absence of all proper information, how is the voted money spent? The Commissioners, about twelve persons of distinction and eminence, fill honorary offices. They cannot, and certainly do not, receive any part of this money. The four attendants are of a class usually employed for such purposes, and paid by the hour, and for them, with a female to clean rooms used for eight hours in the week only, not probably much more than £100 a year would be expended. Then there is a secretary, whose duties must be nearly a sinecure, consisting, perhaps, of some general superintendence, the business at the present slow rate of progress, which refers to the purchase of about twenty portraits in the year, and the acceptance in some courteous terms of about half as many more. He must be well paid if, with the staff enumerated, he makes much hole in £2,000 per annum. But there is a handsome house in Great George-street, the privacy of which is secured by the contrivance for removing the notice board, maintained, warmed, and lighted at the public charge, and of which the public have a partial use for full eight hours in each week. And the secretary, as appears by the Directory, is so fortunate as to enjoy the use of all the remainder. The secretary's salary, and his residential charges, will account for a good slice out of the vote, and the purchase of about twenty portraits of the value already estimated, must exhaust the rest. Perhaps, if we had better information, the whole affair would not have so much the appearance of a snug little job.

How long can such a state of things continue? The whole management seems in a hopeless stagnation, and, without meaning the slightest personal reflection upon anyone, it is quite clear that upon whomsoever the real management falls, the right man is not in the right place. The rooms in which the collection is placed, and the locality, are perhaps partial causes of this want of success—this snail's-pace progress. Lord Stanhope assumed that the collection would be greatly increased by presents. But how is this to be expected. Who would consign a fine picture, the valued portrait of a renowned ancestor, to such a burial place? The present rooms were only intended as a temporary place of deposit, the present arrangements as entirely provisional. The true reform, and the true economy, will be found by putting an end to them at once by withdrawing the present vote for £2,000, and saving the greater part of that sum in the wasteful, useless charges for a separate establishment, retaining only the Commissioners, who, as an honorary body of advisers, would still give useful assistance.

But what is then to become of the collection of portraits? It was originally proposed that they should be added to the National Gallery. Move them then at once to South Kensington, where an interesting part of the National pictures have now found a most suitable locality. There ample space exists, and room for all necessary expansion. There, under the charge of most competent officers, who in what they have already accomplished have given such visible proof of their active public spirit, the collection of portraits will receive a development as prompt and interesting as up to this time it has been sluggish and costly; and there its visitors will find access early and late, and be counted by thousands. At South Kensington, too, there are already a number of very fine portraits. I have counted above thirty, the greater number of which may be classed in the arrangement of the galleries as part of the portrait collection. What an addition Copley's "Death of Chatham" would prove, Lawrence's "Mrs. Siddons," Reynold's "Lord Heathfield," "Lord Ligonier," "Sir William Hamilton," Hoppner's "William Pitt," and others. Then, why may not some other collections find an appropriate resting place here? There are in the Eastern Zoological Gallery of the British Museum above 120 portraits, many of them works of fine-art and of high historic interest, but they are evidently in the way and placed high over the cases and quite out of sight. Move them to South

Kensington. Our country is as rich in historical portraits as it is in its unique records, and if a suitable gallery were provided, how many would at once find their way to form part of a really great national collection? We may be told of insuperable difficulties. I do not believe in them, after what we have seen accomplished at South Kensington. I do not think that they would long stand in the way of zealous museum officers. I am, &c.,

S. R.

ECONOMIC HISTORY OF PARAFFINE.

Sir,—In my paper on this subject, read before your Society on the 20th March last, and reported in your *Journal* of 22nd March, it is stated (p. 297) that "Mr. John Thomas Cooper, the consulting chemist, in 1847, prepared paraffine oil, lubricating oil from paraffine, and paraffine itself, from the distillation of coal." On further examination of the evidence, I think it is clear that Mr. Cooper did not, in 1847, employ bituminous coal, but Kimmeridge shale, in obtaining these results.

I am, &c., CHAS. TOMLINSON.

King's College, June 11, 1861.

THE FIBRE-YIELDING TREE MALLOW.

Sir,—There is a tree, which is plentiful in Colombia, South America, the Coquita, the bark of which yields a fibre of great strength, which is commonly used there for manufacture of ropes, which are very durable, and sold at a trifling rate. Cables made of it have been found to last longer than hempen ones. I am, &c.,

G. H. COUNTZE.

42, Duke-street, St. James's, June 8th, 1861.

Proceedings of Institutions.

Glasgow Institution.—The third annual meeting of this Institution was held on Monday, the 27th ult., Alexander Strathern, Esq., Sheriff Substitute of Lanarkshire, in the chair. The Hall was completely filled. The meeting having been opened with prayer by Mr. M'Kellar, the learned Sheriff said, they must keep in view that this Institution, humble though it may be thought, offers as high advantage, to those who seek to be benefited by it, as the proudest of our Universities and our highest Academic Institutions. It ought to be a subject of congratulation to every lover of his race to know that even the sons of toil may, after their day's labour is past, see an opportunity of improvement, and emulate, nay, even excel, those with far better worldly advantages. The learned Sheriff went on to encourage the students, successful and unsuccessful, to persevere, and the latter above all not to lose heart. He also alluded to the satisfactory progress of the Institution, it having increased from 737, in the year ending in May, 1860, to 1,006 in this year. He then called on the Secretary to read the Annual Report, the more prominent parts of which were as follows:—It commenced by stating that the Institution was formed, not from choice but necessity, to afford the means of instruction in all branches of an English commercial, scientific, literary, and Scriptural education, especially to those so engaged during the day as to prevent them from studying what they may desire, and also for children of the same class, and on the self-supporting principle; that it is, in fact, an Industrious People's College. The Report then went on to enumerate the number of individuals who had attended each class during the past year, the aggregate of which was:—On the roll May 10, 1860, 337; and admitted since, in the day classes 71, evening classes 598; total, 669, making the number of individuals who received instruction within the year 1,006. About 22 per cent. attended two or more classes. The present numbers on the rolls are, day, 106, evening, 211; total 317. The number of tickets sold was 1,825, but from that no inference whatever can be drawn concerning the state of any Institution, unless the price and term of the ticket were well known. After disposing of some minor matters, the Report then went on to state that at first 69 candidates (73 papers) gave in their names for the Preliminary Examinations of the Society of Arts, and 14 for those of the Local Board. Of these, however, only 42 of the former and 10 of the latter came forward, and 28 of the former and 8 of the latter passed; while 27 candidates (28 papers) came up to the Final Examination, and 4 for the Local Board. A much greater number was expected on account of the increased number of students, but the directors, having full confidence in the ability and zeal of their teachers, think this a strong proof that the students and scholars really belong to the class for which the Institution is intended, namely, that portion of the industrial classes whose education requires to be brought up to the passing point rather than those already educated. The pecuniary affairs stood thus:—Income, £384 1s. 8d.; expenditure, rents, taxes, advertising, and all other expenses, £115 8s. 1d.; and salaries to teachers, £268 13s. 7d. The members and students were then congratulated on being able, from this time, to meet all under one roof in a commodious building, 37, Cathedral-street, which they are to have entirely to themselves. Records of thanks to the examiners, teachers, and others, with special reference to the Mutual Improvement Class, and also to the Directors of the popular classes of the Andersonian University for admitting students of this Institution to read from their library, on moderate terms, formed the next part of the Report. It then noticed the Examinations of the day classes by a Committee of the Local Board (who are the authorised Inspectors of all the classes), the result of which was, the passing of 25 as competent to receive Local Board certificates of different grades. These certificates, together with those granted to students, 59 in all, were then presented to the successful candidates by the learned chairman, who had a few kind and pointed words for each as he placed the certificate in his or her hand.

Salford Working Men's College.—The third Annual Report of the Council states that the tenth term of this College has concluded, and although in the last report, the council considering that sufficient data had been obtained, ventured to form favourable conjectures as to the probable future of the College, the experience of another year has much more than justified the highest anticipations therein expressed. The progress of the Institution has been most satisfactory. Term by term, the number of the students has increased, the average per term for the year 1859 being 164, and that for 1860, 225. The rapid and yet uniform advancement of this Institution, devoted as it is exclusively to education, tends to show the soundness of the principles upon which Working Men's Colleges were originally projected, and to prove that if instructors will meet working men, as men engaged in the pursuit of knowledge on its own account, they need not fear the want of eager and willing pupils. An interesting feature in the history of this College, young as it is, and one which must ultimately have an important influence in consolidating and giving permanency to the Institution, is that the young men who have been trained within its walls, are becoming energetic teachers, so that different sections of the several classes are by this means being formed, to meet the various stages of the progress of pupils. In the last annual report, reference was made to the union of the College with the Society of Arts, and to a Local Educational Board for the district then in course of formation. This Board is now duly constituted, and its formation will enable all those members of the College who are sufficiently qualified, to obtain the certificates of merit, annually awarded by the Society, or to compete for its prizes. The possession of these certificates and prizes, (the report says) will be of great advantage to their possessors, inasmuch as they are universally acknowledged as an undoubted guarantee of proficiency in the several

branches of education to which they respectively refer. They will also be an assurance to the student, that the knowledge he possesses is of so sound and comprehensive a character, as to be depended upon in his further and higher researches. From the Local Board also, consisting, as it does, of gentlemen fully able to guide and promote educational movements, much advantage may be expected, from the advice which it will be its duty to give to the Council. The examination of the pupils being under its superintendence, the merits and defects in the mode and character of the instruction afforded by the College may fairly be reviewed and advantageously commented upon. The formation of Female Evening Classes, in connection with the College during the past year, offers a new field for congratulation. The female pupils, although at present few in number, are yet steadily increasing, and the classes have in other respects an improving aspect. The number of females attending these classes during the first term was 8, 2nd term was 12, 3rd term was 16, and the number entered during this present term is 20. The following table exhibits at one view the several classes now in active operation at the College, the number of students who entered each class, and the average attendance during each term:—

CLASS.	1st Term.		2nd Term.		3rd Term.		4th Term.	
	No. in Class.	Averg. attndc	No. in Class.	Averg. attndc	No. in Class.	Averg attndc	No. in Cl.	Aver attn.
Writing and Book-keeping	55	30	38	25	vacation		68	45
French, 1st section ...	6	5	4	3	5	4	7	7
,, 2nd section...	16	13	17	12	12	9	15	11
Algebra, 1st section .	10	5	6	3	vacation		5	4
,, 2nd section.	4	2	3	2	ditto		5	2
Mechanical Drawing.	13	9	20	14	16	10	19	14
Practical Arithmetic, 1st section	10	7	13	9	vacation		14	8
Practical Arithmetic, 2nd section	39	13	35	20	ditto		40	25
Chemistry	13	10	10	7	ditto		11	7
Phonography	not formed		not formed		51	36	45	31
Grammar, 1st section	12	9	11	8	16	10	22	13
,, 2nd section	39	18	38	25	vacation		39	23
Logic	13	11	16	13	ditto		11	10
Drawing and Painting	not formed		12	9	18	11	23	16
Mensuration	ditto		9	5	vacation		3	2
German	ditto		not formed		not formed		13	8
Latin, 1st section ...	8	6	9	6	vacation		6	3
,, 2nd section ...	5	2	3	2	ditto		5	3
Elocution	25	22	18	12	ditto		26	19
Geology	13	9	7	6	ditto		13	10
Rudimentary Classes.	36	18	24	10	20	9	39	18
Female Classes ...	not formed		8	5	12	6	18	10

The trades of the 327 members are:—Mercantile clerks, 63; warehousemen, 56; printers, 20; decorative artists, 7; shopmen, 11; teachers, 7; various handicraftmen, 51; labourers, millhands, and sundry miscellaneous occupations, 112; total, 327. In addition to the members hitherto spoken of, the College has about 30 annual subscribers, 31 life members, 15 honorary members, and 26 honorary teachers; the total members of the College of every description, numbering 424 individuals. In addition to the classes contained in the return for the past year, a class for the study of English History and Literature, a class for gymnastics, drill and fencing, and an essay and discussion society have been formed and opened. The boys and girls' day schools maintained by the College, are in a steadily improving condition. The boys' day school has increased from 120 to 135, with an average weekly attendance of 103. The girls' day school has progressed rapidly. During the year ended December 1859, the number of girls on the register was 58, and the average attendance 41. In December last the number of girls on the register was 91, and the average attendance 68. The boys' evening classes are still continued, the number on the books having averaged 35 per month and the average attendance being 28. The income of the year on revenue account, from every source, amounted to £247 13s. 2d., and the expenditure to £218 17s. 5d. The balance in favour of the College, £28 15s. 9d., has been applied in re-imbursing the Treasurer the sum of £28 14s. 10d., overpaid by him during the preceeding year, so that the College has commenced a new year free from debt.

To Correspondents.

Erratum.—In last *Journal*, at page 528, col. 1, line 38, for "October, 1849," read "March, 1850."

MEETINGS FOR THE ENSUING WEEK.

Tues. ...Statistical, 8. Dr. Steele, "Statistical Analysis of Patients treated in Guy's Hospital from 1854-60 inclusive."

Wed. ...Geological, 8.

Thurs...Zoological, 4.
Philosophical Club, 6.
Numismatic, 7. Anniversary.
Linnæan, 8.
Chemical, 8. Dr. Roscoe, "On the application of the induction coil to Steinheil's apparatus for spectrum-analysis."
Royal, 8½.

Sat.......Royal Botanic, 3¾.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Num.

Delivered on 29th and 30th May, 1861.

248. Bishops' Lands (Ireland)—Returns.
273. Worcester Bishopric—Return.
277. Conveyance of Mails (Galway and America)—Return.
278. Prisoners—Return.
280. Scottish Universities—Copy of an Ordinance.
276. Atlantic Royal Mail Company—Copy of a Letter, &c.
149. Bills—University Elections (as amended by the Select Committee).
150. ,, Jersey Court.
152. ,, Municipal Corporations Act Amendment.
Syria—Convention for prolonging Occupation to 5th June, 1861.
Affairs in Japan—Correspondence.

Delivered on 31st May, 1861.

255. Australian Mail Service—Return.
142. Bills—Annoyance Jurors (Westminster) (Amended).
151. ,, Local Government Supplemental.
United States—Correspondence respecting Blockade.
Poor Law Board—Thirteenth Annual Report.

Delivered on 1st and 3rd June, 1861.

276. Atlantic Royal Mail Company—Letter, &c. (a corrected copy).
284. East India (Vellore Mutiny Commission)—Return.
290. Isle of Man—Return.
293. Committee of Selection—Seventh Report.
297. University Elections Bill—Report and Minutes of Evidence.
132. Bills—Harbours (amended).
153. ,, Volunteers Tolls Exemption (No. 2) (amended).
154. ,, Excise and Stamps (as amended in Committee and on Re-commitment).
155. ,, Lace Factories.
Captain Macdonald (Arrest and Imprisonment)—Further Correspondence.

Delivered on 4th June, 1861.

282. Foreign Sugar—Account.
106. Bill—Window Cleaning, &c.
China—Correspondence respecting the Opening of the Yang-tze-Kiang River to Foreign Trade.

Delivered on 5th June, 1861.

286. Transportation—Report from Committee.
294. Sewers Commissions—Return.
296. British Dependencies—Return.
300. Armed Cruizers and Privateers (America)—Copy of a Letter.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, June 7th, 1861.*]

Dated 5th March, 1861.

554. T. Petitjean, 4, Brydges-street, Covent-garden—Imp. in the manufacture of glass.

Dated 17th April, 1861.

939. J. R. Hill, Duke-street, Adelphi—Imp. in clutches or connections for machinery.

Dated 29th April, 1861.

1072. F. A. Thonier, Bourbon l'Archambault, France—Imp. in reaping machines.

Dated 2nd May, 1861.

1102. L. Glatard, Roanne, France—Improved means or apparatus for releasing horses from vehicles, and for locking the wheels thereof in prevention of accident.

Dated 3rd May, 1861.

1114. P. A. Godfroy, 3, King's Mead-cottages, New North-road, Islington—An imp. in the manufacture of gutta percha.

Dated 7th May, 1861.

1154. J. H. Johnson, 47, Lincoln's-inn-fields—An imp. or imps. in buttons for garments or other purposes. (A com.)

Dated 8th May, 1861.

1158. T. Blackburn and M. Knowles, Blackburn—Imp. in looms for weaving.

1164. L. Wyttenbach and P. Lugand, 12, Rue Caumartin, Paris—Imp. in fire-escapes.

Dated 10th May, 1861.

1188. A. L. E. Maulbon, 15, Passage des Petites Ecuries, Paris—Imp. in machinery or apparatus for manufacturing tiles. (A com.)

1192. P. A. Godefroy, 3, King's Mead-cottages, New North-road, Islington—An imp. in the treatment of india-rubber.

Dated 11th May, 1861.

1196. H. J. Davies, Carlisle—Imp. in apparatus or machinery for printing textile fabrics or materials.

1202. G. F. Jones and J. Jones, York—Imp. in the form and construction of ships or vessels, and of arched ribs for roofs, domes, and bridges.

1204. W. H. Tooth, Rhodeswell-road, Middlesex—Imp. in machinery or apparatus for reducing vegetable substances to a finely-divided state, part of which imps. may also be employed for sifting or separating the fine from the coarse particles of other substances.

Dated 13th May, 1861.

1218. J. H. Johnson, 47, Lincoln's-inn-fields—An improved magic lantern, and of views to be used therewith. (A com.)

1219. W. Smith, Little Woolston, Buckinghamshire—Imp. in cultivators, ploughs, and apparatus used therewith when cultivating and tilling land.

Dated 17th May, 1861.

1263. G. Davies, 1, Serle-street, Lincoln's-inn—A peculiar mode of arranging advertisements, so as to secure a more general and constant publication. (A com.)

Dated 20th May, 1861.

1288. O. Papengouth and L. I. Lehmann, Blackfriars-road—Imp. in propelling vessels, and in apparatus for the same.

Dated 23rd May, 1861.

1305. L. Lumb, Brotherhood Mills, near Rochdale, and W. H. Butterworth, Reed hill, Rochdale, Lancashire—Imp. in undercovers of carding engines.

1306. C. Nuttall, 34, South-lane, Rochdale, Lancashire—Imp. in machinery for grinding the cards of carding engines, and in machinery for making the same.

1307. J. Hynam, Wilson-street, Middlesex—Imp. in apparatus for arranging splints for matches, and for placing them in the frames ready for "dipping."

1309. J. H. Dart, 5, Church court, Clement's-lane—Imp. in the manufacture of paper.

1311. R. A. Brooman, 166, Fleet-street—Imp. in portable cooking apparatuses. (A com.)

1312. E. Partridge, Smethwick, Staffordshire—An improved method of lubricating carriage axles.

1313. H. M. F. J. V. de la Tour-du-breuil and M. A. de la Tour-du-breuil, 29, Boulevart St. Martin, Paris—A copying press, so called "telegraph-press."

Dated 24th May, 1861.

1314. C. Batty, 196, Marylebone-road, Middlesex—Imp. in the mode of and apparatus for warming and ventilating rooms and buildings.

1315. B. Collingham, Keighley, Yorkshire, and M. Mason, Manchester—Imp. in flyers employed in machinery for preparing and spinning fibrous substances.

1317. R. Joslin, 36, King William-street—Imp. in gentlemen's scarfs.

1318. G. Herbert, Summer-hill, Dartford, Kent—Imp. in apparatus for striking bells.

1319. J. Paterson, Wood-street—An imp. in clasps or buckles.

1320. R. Preece, Clapham-road, Surrey—An imp. in floors.

Dated 25th May, 1861.

1321. H. Waller, Lickhill, near Calne, Wiltshire—An improved horse rake.

1323. W. Roberts, Millwall, Poplar—Imp. in vices and screw benches.

Dated 27th May, 1861.

1324. W. Kay, Bolton-le-Moors, Lancashire, and I. Kay, Leverbridge, near Belton-le-Moors—Imp. in machines for spining and doubling.

1325. E. Green and J. Cadbury, Birmingham—Certain imp. in buttons for general use.

1326. W. Smith, Green Nook Mill, Lancashire, J. Lord, and H. Barlow—Imp. in looms for weaving.

1327. T. Moore, Southwark-bridge-road, Surrey—Imp. in apparatus for raising water and other fluids, which same apparatus may also be employed as a prime mover.

1329. C. S. Duncan, Kildare-terrace, Bayswater—Imp. in the construction of electric telegraph cables or ropes.

1330. L. A. S. Churchill, 16, Rutland-gate, and E. W. H. Schenley, 14, Princes-gate, Middlesex—Imp. in buffing and coupling apparatus for railway carriages. (A com.)

1331. J. Lee and B. D. Taplin, Lincoln—Imp. in the manufacture of portable or traction steam engines, and in apparatus for cutting joints, heads of connecting rods, and other articles.

1332. W. B. Holbech, Thurlaston Lodge, Leicestershire—Imp. in apparatus for sowing seeds.

1333. W. N. Nicholson, Newark-on-Trent—Imp. in machines for making and collecting hay, and for collecting similar substances; parts of which imps. are applicable to cutting thistles and other weeds.

Dated 27th May, 1861.

1335. E. R. Burnham, Liverpool—Imp. in the manufacture of boots, shoes, and other coverings for the feet made of india-rubber, gutta-percha, and like substances.

1336. P. A. Millward, Wednesbury, Staffordshire—Imp. in the manufacture of coke.

Dated 29th May, 1861.

1337. G. W. Rendel, Elswick Ordnance Works, Northumberland—Imp. in the manufacture of wrought iron cylinders for the construction of ordnance.

1338. R. M. Letchford, Old Montague-street, Middlesex—An imp. in the manufacture of matches.

1339. G. Asher, Birmingham—An imp. or imps. in the manufacture of metallic fenders.

1340. H. Crichley, Birmingham—Imp. in the manufacture and ornamentation of metallic chimney pieces or mantel pieces, and in the ornamentation of metallic stoves and fire places.

1341. E. H. C. Monckton, Parthenon Club, Regent-street—Obtaining and applying magnetic motive power.

1343. C. Ching, Castle-street, Long Acre—Imp. in gas chandeliers.

1344. T. Hale, 21, Barnsbury-row, Park-road, Islington, and A. Wall, 12, Canton-street, East India-road—Imp. in the construction and internal arrangement of furnaces, and in the preparation, manufacture, and treatment of clays, and of articles, surfaces, structures, and erections, subject to the action of fire or atmospheric influence.

1345. W. E. Newton, 66, Chancery-lane—Imp. in refining and purifying iron, and converting the same into steel. (A com.)

Patents Sealed.

[*From Gazette, June 7th*, 1861.]

June 7th.

3022. T. Peake.
3036. R. A. Ford & W. A. Paige.
3047. A. F. Jaloureau.
3050. C. P. Moody.
3051. G. S. Harwood.
3060. G. E. Chantrell.
3068. E. Jones.
3084. G. Davies.
3086. G. Davies.
3088. A. Kinder.
3100. J. G. Taylor.
3136. D. A. Morris.
3182. W. E. Newton.
3183. A. V. Newton.
118. A. V. Newton.
248. G. T. Bousfield.
250. G. T. Bousfield.
468. J. Warren.
718. T. S. Truss.
826. J. T. Grice.

[*From Gazette, June 11th*, 1861.]

June 11th.

3053. G. Richardson and E. D. Chattaway.
3057. J. Casson.
3061. C. Neville.
3063. S. Pitts.
3080. H. Barber.
3085. G. Davies.
3087. J. G. Williams.
3089. A. Prince.
3105. C. Stevens.
3113. J. H. Johnson.
3131. F. B. Baker.
3157. J. A. Fanshawe and J. A. Jaques.
3163. S. Desborough and S. Middleton.
3. M. Henry.
17. A. V. Newton.
25. A. Fairbairn.
251. G. T. Bousfield.
513. W. J. Hay.
539. G. G. Sanderson.
585. B. Britten.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, June 7th*, 1861.]

June 3rd.

1469. P. P. C. Barrat and J. B. Barrat.

June 5th.

1277. J. Ferrabee.
1305. P. Domont.

[*From Gazette, June 11th*, 1861.]

June 6th.

1278. J. J. Rowley.
1318. T. Chatwin and C. Taylor.

June 7th.

1292. J. Bunnett.
1304. J. Easterbrook.
1328. G. Bartholomew.
1368. T. Steven.

June 8th.

1414. S. Barlow.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, June 11th*, 1861.]

June 8th.

1279. J. Bernard.

Journal of the Society of Arts.

FRIDAY, JUNE 21, 1861.

FINANCIAL STATEMENT.

The following Statement is published in this week's *Journal*, in accordance with Sec. 42 of the Society's Bye Laws, which provides that at the Annual General Meeting "the Council shall render to the Society a full account of all their proceedings, with a statement of the Receipts, Payments, and Expenditure during the past year; and a copy of such Statement shall be published in the *Journal* of the Society on the Friday before such General Meeting."

ANNUAL STATEMENT OF RECEIPTS, PAYMENTS, AND EXPENDITURE, FOR THE YEAR ENDING 31st MAY, 1861.

Dr.

	£ s. d.	£ s. d.
To Subscriptions for the year:—		
From Members and Institutions in Union with the Society...		4,079 18 0
Outstanding ...	1,367 5 0	
Estimated available arrears		911 10 0
Life contributions ...		567 0 0
To Dividends on Stock:—		
£5,156 3s. 10d. Consols ...	147 13 4	
£388 1s. 4d. New Three per Cents	11 3 2	
		158 16 6
Interest on Commercial Bank Account		2 10 0
To Sale of Microscopes	2 17 6	
,, Transactions	1 10 0	
,, Catalogues	1 12 0	
Admissions to the Ross Exhibition	5 18 0	
Repayment for Gas	10 10 0	
,, on account of expenditure on Exhibition of 1862	1,200 0 0	
		1,222 7 6
To Special Subscriptions held in trust:—		
Examination Prize Fund at the London and Westminster Bank ...	42 11 0	
Interest on ditto	2 11 0	
Subscription in hand	5 0 0	
Fees paid by Local Boards	2 6 6	
Ditto outstanding ...	6 19 0	
		59 7 6
Marine Algæ Prize ... £70 0 0		
South Australian Institute		100 0 0
		£7,101 9 6

Cr.

	£ s. d.	£ s. d.
By General Establishment Expenses:—		
Rent, Rates, and Taxes	184 1 1	
Insurance, Gas, Coals, and House Charges	181 1 3	
Salaries, Wages, and Commissions	1,045 16 7	
Postage Stamps and Carriage of Parcels	202 10 2	
Stationery and Printing (not including Journal)	219 13 8	
Advertising	11 5 0	
		1,844 7 9
By General Expenditure:—		
Working Classes Museum ...	35 12 8	
Library	45 2 8	
Journal ... 1,014 13 8		
Less charged to Union of Institutions... 101 9 4	913 4 4	
Union of Institutions, including Journal, Examinations, Postage, Stationery, Printing, and other charges	675 14 6	
Examination Prizes Awarded	231 0 0	
Medals ...	14 3 6	
Exhibition of 1862 ...	1,412 4 11	
Exhibition of the Works of the late Sir W. C. Ross, R.A. ...	48 2 10	
Exhibition of Inventions	70 6 7	
Proposed Exhibition of the Pictures by the late Mr. Leslie	1 16 0	
Artistic Copyright during the present year ...	25 15 7	
Musical Pitch Committee ...	12 18 6	
Surgical Instrument Committee ...	2 15 0	
Dinner ...	26 8 0	
Conversazioni...	63 9 7	
Repairs and Alterations	44 3 1	
Marine Algæ Prize ...	0 17 4	
		3,623 15 1
By Special Expenditure:—		
South Australian Institute...		47 2 1
		5,515 4 11
By Excess of Income over Expenditure		1,586 4 7
		£7,101 9 6

BALANCE SHEET, 31st MAY, 1861.

Dr.

	£ s. d.	£ s. d.
To Sundry Creditors, viz.:—		
To Tradesmen's Bills	308 7 9	
Fees to Examiners	185 17 0	
Examination Prizes	231 0 0	
Salaries and Commissions	30 7 11	
Petty Cash...	12 1 4	
		767 14 0
To Economic Museum		177 2 6
Examination Prize Fund		42 11 0
Subscription in hand		5 0 0
South Australian Institute		52 17 11
Marine Algæ Prize	70 0 0	
To Trust Liability in respect of Government Stock (Consols) held for specific purposes, as per contra, viz.:—		
Set apart to answer—		
Swiney Prize	1,333 6 8	
Stock Trust	100 0 0	
To Government Stock New 3 per Cents., set apart to answer Fothergill Trust ...	388 1 4	
		1,045 5 5
By excess of Assets over Liabilities...		4,938 5 2
		£5,983 10 7

Cr.

	£ s. d.	£ s. d.
By Cash in Hand:—		
At Messrs. Coutts and Co....	687 10 4	
At London and Westminster Bank, available for Examination Prizes	42 11 0	
In the hands of the Secretary	5 0 0	
At the London and Westminster Bank, held in trust, to be awarded as a Prize for an Essay on Marine Algæ, £70.		
		735 1 4
By Balance of Advance on Account of the Exhibition of 1862 ...		939 11 6
By Consols £3,702 17s. 2d. at 91¾ ...		3,397 7 9
Subscriptions in Arrear ...	1,367 5 0	
Estimated not recoverable to the amount of	455 15 0	
		911 10 0
By Government Stock, held in trust, applicable to specific purposes, viz.:—		
Consols...	1,433 6 8	
New 3 per cents.	388 1 4	
		£5,983 10 7

Society's House, Adelphi,
June 18, 1861.

(Signed) ARTHUR J. LEWIS, JOHN ALGER, } *Auditors.*
P. LE NEVE FOSTER, *Secretary.*

ANNUAL GENERAL MEETING.

The One Hundred and Seventh Annual General Meeting, for the purpose of receiving the Council's Report, and the Treasurer's Statement of Receipts, Payments, and Expenditure during the past year, and also for the Election of Officers, will be held (in accordance with the Bye-Laws) on Wednesday next, the 26th inst., at 4 o'clock, p.m.

The Council hereby convene a Special General Meeting of the Members of this Society, to ballot for the election of Members, such meeting to take place at the close of the Annual General Meeting. By order of the Council,

P. LE NEVE FOSTER, *Secretary.*

ONE HUNDRED AND SEVENTH ANNIVERSARY DINNER.

The One Hundred and Seventh Anniversary Dinner of the Society took place at the Crystal Palace on Wednesday, the 19th inst., the Right Hon. the Earl of Elgin, K.T., K.C.B., in the chair. About 400 members and their friends were present. The report of the proceedings will appear in the next number of the *Journal.*

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £417,250, have been attached to the Deed.

Her Majesty's Commissioners have appointed the following Committee in addition to those already published in the *Journal:*—

For Class 29 (Educational Works, &c.), The Right Hon. C. B. Adderley, M.P.; Right Hon. W. Cowper, M.P.; Sir John Acton, Bart., M.P.; R. R. W. Lingen, Esq.; the Very Rev. the Dean of Hereford; the Very Rev. the Dean of Christchurch, Oxford; the Rev. the Master of Trinity College, Cambridge; the Rev. Dr. Temple; the Rev. B. M. Cowie; Harry Chester, Esq.; the Rev. Samuel Clark; the Rev. F. C. Cook; J. G. Fitch, Esq.; Ed. Hamilton, Esq.; J. W. Hooker, Esq., D.C.L.; Rev. M. Mitchell; W. Portal, Esq.; J. S. Reynolds, Esq.; Rev. W. Rogers; Philip L. Sclater, Esq.; and Rev. A. Wilson.

The following arrangements, in addition to those already published, have been made in foreign countries and the Colonies in reference to the Exhibition:—

Tasmania.

Fred. A. Du Cros; Joseph Milligan, Esq.; and James A. Youl, Esq.

South Australia.

G. S. Walters, Esq.

Queensland.

M. H. Marsh, Esq., M.P.; Alfred Denison, Esq.; Arthur Hodgson, Esq.; and Henry Jordan, Esq., Secretary.

Guiana.

W. Walker, Esq., Chairman; J. Trounsell Gilbert, Esq., Vice-Chairman; and Sir W. Holmes, Secretary.

British Columbia.

His Excellency Governor Douglas, President; Colonel Moody, Vice-President; Captain Gossett and Dr. Seddell, Hon. Secretaries.

Vancouvers' Island.

His Excellency Governor Douglas, President; Alfred Waddington, M.P.P., Vice-President; Joseph W. Trutch, Esq., and Dr. Wood, Hon. Secretaries.

Malta.

Hon. Sir Victor Houlton, K.C.M.G., Chief Secretary to Government; Sir Adrian Diorgli, K.C.M.G., C.B., Crown Advocate; Filippo Pullicino, LL.D., Elected Member of Council; Fran. M. Toweggiani, LL.D., Elected Member of Council; Savono Schembri, M.D., Rector of the University.

Russia.

Conseiller Privé Lewschine, Président; Le Conseiller du Ministère des Affaires Etrangères et Conseiller d'Etat actuel, Evers; du Ministère des Finances, le Conseiller d'Etat actuel, Butowski; du Ministère des Finances le Conseiller d'Etat actuel, Scherer; du Ministère des Domaines le Conseiller d'Etat actuel, Lode; Le Conseiller d'Etat Petersohn, et l'Assesseur du Collège Tscherniajeu et du Département des Apanages le Conseiller d'Etat actuel, Hernet.

TENTH ANNUAL CONFERENCE.

The Tenth Annual Conference of the Representatives of the Institutions in Union, and the Local Educational Boards, with the Council of the Society, was held at the Society's House on Tuesday, the 18th inst., at half-past 10 o'clock, a.m. Sir Thomas Phillips, F.G.S., Chairman of the Council, presided.

The following is a list of the Institutions and Local Educational Boards represented at the Conference, with the names of their respective Representatives:—

Aberdeen Local Board	Mr. Charles Fyfe.
Aldershot, Institution	Rev. Dr. Rule.
,, Local Board	Mr. Barrow Rule, M.C.P.
Banbury, Mechanics' Institute	Mr. J. H. Beale.
Barnet, Institute	Mr. Stephen Baldock.
Basingstoke, Mechanics' Institution	Mr. W. W. Beach, M.P. Mr. Wyndham S. Portal, V.P.
Birmingham, Messrs. Chance's Library and Reading-rooms	Mr. F. Talbot.
Blackburn, Literary and Mechanics' Institution	Mr. R. H. Hutchinson.
Bromley, Literary Institute	Mr. S. P. Acton.
Bromsgrove Literary and Scientific Institution	Mr. T. H. Galton.
Chelmsford, Literary and Mechanics' Institution	Mr. Jabez Church, C.E.
Chichester Literary Society and Mechanics' Institute	Mr. H. W. Freeland, M.P.
Darlington, Local Board	Mr. J. W. Pease, (Chairman).
Deptford, Local Board	Mr. H. E. Montgomerie.

Droitwich, Mechanics' Institute	Mr. J. S. Pakington.
Farnham, Young Men's Association	Mr. Henry Poppleton, L.C.P.
Glasgow, Popular Evening Classes, Andersonian University	Prof. Allen Thomson, M.D.
	Mr. Walter M. Neilson.
,, Institution and Local Board	Mr. Robert Dalglish, M.P.
,, Mechanics' Institution	Mr. Robert Dalglish, M.P.
,, Local Board	Mr. David More.
,, Athenæum	Mr. John Mayer.
Halifax, Working Men's College	Mr. E. Akroyd.
Halstead, Literary and Mechanics' Institution	Mr. G. W. Harris, President.
Hastings, Mechanics' Institution	Mr. C. J. Womersley. President.
	Rev. J. Alton Hatchard, Vice-Pres.
	Mr. J. Huggett, Sec.
Hertford, Literary and Scientific Institution	Mr. J. Marchant, Sen.
Holmfirth, Mechanics' Institution	Mr. Jno. Hixon, President.
Leeds, Yorkshire Union of Mechanics' Institutes	Mr. Barnett Blake.
Lichfield Free Library	Captain Dyott.
Lincoln, Newland Young Men's Christian Association and Mutual Improvement Society	Mr. J. T. B. Porter.
Lockwood, Mechanics' Institution	Mr. R. J. Bentley.
London and South-Western Literary and Scientific Institution	Mr. J. W. Walsh, Dep.-Chairman
	Mr. Hayes Kyd, Hon. Sec.
,, Metropolitan Evening Classes, Sussex Hall	Mr. J. Marshall Carpenter.
	Mr. Fred. Reynolds.
,, St. Thomas, Charterhouse, Evening Classes	Rev. R. Holme.
,, Walworth Literary and Scientific Institution	Mr. J. S. Noldwritt.
,, Mechanics' Institution,	Mr. S. Vallentine.
	Mr. T. J. Pearsall.
,, ,, Local Board	Mr. T. A. Reed.
,, Notting-hill Working Men's Association	Mr. E. Harvey.
,, ,, Local Board	Mr. Newmarch.
,, Tailor's Labour Agency Literary Institute	Mr. Robt. Coward, Secretary.
,, Beaumont Philosophical Institution	Mr. D. Francis.
Macclesfield Useful Knowledge Society and Local Board	Mr. T. U. Brocklehurst.
Manchester, Mechanics' Institution	Mr. R. Rumney.
Morpeth, Mechanical and Scientific Institute	Mr. Matthew Soulsby.
Newcastle-on-Tyne, Mechanics' Institution	Mr. Somerset Beaumont, M.P., Pres.
Nottingham, Mechanics' Institution	Mr. Chas. Paget, M.P.
Peterborough, Mechanics' Institution	Dr. Porter, President.
,, Local Board	Rev. W. Cape.
Portsea and Portsmouth Athenæum and Mechanics' Institute	Maj.-Gen. Whylock, R.M., President.
Salford, Working Men's College,	Mr. David Chadwick.
	Mr. Charles Mercier.
	Mr. J. Plant.
South Staffordshire Union Local Board	Lord Lyttelton.
Southern Counties Adult Education Society	Hon. and Rev. S. Best.
Waterford, Mechanics' Scientific Institute	Mr. J. A. Blake, M.P.
Whitby Institute	Mr. Edwin Cockburn.
Winchester, Mechanics' Institution	Mr. Robt. Hayles.

The Chairman said it afforded the Council great gratification to meet the Representatives of the various bodies in union with the Society. It gave them some opportunity at all events of ascertaining what was doing—what good was accomplished—what difficulties had been overcome, and what still remained to be overcome; and although no doubt most of them who entertained an ardent spirit in a work of this kind had often felt disappointment at the comparatively slow progress it had made, yet they might be encouraged by the conviction that all moral improvements were slow in their progress; moreover, the object when accomplished was durable in its results, and calculated to elevate our common humanity. Of course, now as ever, much of the seed sown had fallen upon thorns, and much upon stony ground, but they might rest assured that there was much of it which was not dead, although it did not at present give to them indications of vitality, and that they would see it germinate, although it might be covered probably with the snow of many winters. He had no doubt, looking at the spirit in which they had engaged in the work, they would not be without their reward if they continued to labour with the same zeal as they had hitherto done. He would now call upon the Secretary to read his Annual Report to the Council.

The Secretary read the following

REPORT

To the Council of the Society for the Encouragement of Arts, Manufactures, and Commerce.

Gentlemen,—In compliance with the annual custom, I present my report in reference to the business of the Union of Institutions during the past year; and, taking a general view of the action and condition of the Institutions, I am happy to state that there is more real educational work done by them than at any former period—more attention is paid to systematic teaching, and less to desultory lectures. The numbers attending the Examinations steadily increase, though the increase may not be so rapid as the friends of the Institutions might desire.

Since the date of my last report, Four of the Candidates who distinguished themselves at the last year's Examinations have been successful, after competition, in obtaining Government appointments.

Mr. Henry Simpson, Birmingham and Midland Institute.

Mr. Archibald S. Lang Macdonald, Glasgow Mechanics' Institute.

Mr. Joseph Marshall Carpenter, Sussex Hall Evening Classes; and

Mr. Wm. Vaughan, also of that Institution.

The first two were nominated to the competition by the Council of this Society, the nomina-

tions having been kindly placed at their disposal by Lord Granville; there were five appointments vacant, and fifteen competitors. It is a matter of congratulation that four out of the five appointments were obtained by those who had been successful in the Society's Examinations.

I now turn to the Examinations of the present year, which are just concluded, and the results of which have been given in the *Journals* of the 31st May and 7th June. There have been this year 750 candidates examined, a larger number than at any former period, and an increase of 164 over the number examined last year. There has been no alteration in the system of conducting the Examinations, which each year successfully stands the test of increasing numbers coming up for examination. The Examinations were carried under the supervision of 73 Local Educational Boards, being 10 more than last year; and, as the Staffordshire Local Board had nine branches, the Examinations this year were held at 81 places, which is an increase of 18 over last year. They have returned 839 candidates as coming up to the previous Examination, of whom they passed 684 as fit to be examined at the Final Examinations of the Society. The difference between this number and the 750 examined is explained by remembering that, in addition, there must be taken into consideration those who had received Certificates of the Second and Third classes in former years, and who, therefore, needed not to undergo the previous Examination. Of the 750 examined, 618 passed the Final Examinations, 132 being unsuccessful; that is, a larger proportion this year have not passed than last year, when 108 only were unsuccessful, out of 586 examined. This might be construed as expressing a less careful attention on the part of the Local Boards in testing the Candidate's qualifications at the previous Examinations, but the difference is so small that the result is more probably due to that natural fluctuation which must occur, rather than to any less care on the part of the Local Boards. The total number of papers worked at the Examinations was 1,079, as compared with 821 last year. The Examiners have awarded, on these papers, 216 First-class Certificates; 287 Second-class Certificates, and 339 Third-class, making in all 842 Certificates awarded, in the place of 656 last year. The unsuccessful papers in the present year are 237, being a larger proportion of the whole number of papers worked than last year, when 165 papers only, out 821, were declared unworthy of Certificate.

With regard to Prizes, there were taken this year by Candidates in all £153; by Institutions, £50; by Local Boards, £28; making a total of £231.

In the Appendix will be found tables showing the general statistical results of the Examinations. Inspection of the tables shows that the great bulk of the Candidates took arithmetic, book-keeping, and algebra, whilst but a small proportion, comparatively, worked papers in mensuration, geography, and English literature, but the number of Candidates in French far exceeded that of the Candidates in any one of these three latter subjects. The number examined in German this year was unaccountably small, there being only five Candidates in the place of sixteen last year. In music the Candidates have increased threefold, and all obtained Certificates, and the Examiner reports progressive improvement in this branch of the Examinations. In Latin the number of Candidates was doubled, and chemistry had a larger number of Candidates than on any previous occasion. It will be remembered that some new subjects for Examination were added to the list—mining and metallurgy, and domestic economy—and that drawing, both free-hand and mechanical, was, at the request of the Institutions, after having been discontinued, again inserted in the programme. A small number of Candidates appeared in each of the two first named subjects, but in free-hand drawing there were 40 Candidates, a larger number than have ever been examined in any previous year, a result which fully justifies the re-insertion of that subject in the list. In my last report I called attention specially to the paucity of Candidates in certain subjects, such as botany and its application to horticulture, agriculture, physiology in relation to health, practical mechanics, and some others of that practical character connected with the daily employment of the many. The remarks I then made are equally applicable on the present occasion. In Botany the Candidates are less than half those of the former year. In Agriculture there is but one Candidate, the first for several years. There is a small increase of Candidates in the subject of Practical Mechanics, but no First-class Certificate has been obtained; indeed, I may state that, during the whole period that the Examinations have been established no Candidate has yet received a First-class Certificate in this subject, and it would appear from an examination of the worked papers, that this arises from a general want of knowledge, on the part of the Candidates, of the fundamental principles (not theoretical) upon which the practice of mechanics is based. The Candidates give very creditable answers to many of the questions, but those which involve a knowledge of principles are left untouched, and while this is so, it is clear that no First-class Certificate can be properly awarded.

In continuation of the statistical information given in previous reports, I now append the occupations of the 809 Candidates whose return papers were received, 750 of whom were examined.

Occupations, or intended Occupations, of the 809 Candidates whose Return Papers were received.

Accountants	1
,, assistants	6
Agents	2
Architects and Architectural Students	8
Art Pupil-Teacher	1
,, Students	3
Assistant in Deaf and Dumb School	1
Assistant in Observatory	1
Attendant in Librarian's Office, British Museum	1
Attendant on Machinery	1
Auctioneer	1
Auctioneer's Clerk	1
Baker	1
Boat Guager	1
Bookbinder	1
Book-keepers	22
Booksellers	2
,, Assistant	1
Boot-closer	1
,, and Shoemakers	5
Brass-founder	1
,, turner	1
Bricklayer	1
Brick and Tile-maker	1
Brushmaker	1
Builders	3
,, Clerk	1
Butchers	3
Cabinet-makers	4
Card-printer	1
Carpenters	4
Carpet-weaver	1
Carvers and Gilders	2
Cashiers	2
Caulker	1
Chandelier-maker	1
Chemists and Chemists' Assistants	12
Chemists and Druggists	5
Civil Engineers	2
,, Service	4
Clerks, Attorneys' Articled	1
,, Cathedral, Lay	1
,, Customs'	1
,, Government	2
,, Law, &c.	24
,, Commercial, &c.	224
,, Post-office	3
,, Railway	9
,, Telegraph	3
Cloth-drawer	1
,, finisher	1
Coach-body-maker	1
Coachbuilders' Apprentice	1
Collectors	2
Colliery - management (studying)	1
Colour-maker	1
Compositor	1
Confectioner	1
Core-maker	1
Corn-merchant' assistant	1
Currier	1
Dentist	1
Dispensers	2
Drapers and Assistants	4
Draughtsmen	2
Drawers	2
Dressing-case-maker	1
Druggists and Assistants	3
Dyers	4
Engineers & Apprentices	12
Engine-driver	1
,, fitters	5
Engraver	1
,, (ornamental)	1
Engraver's Tool-maker	1
Factory Operative	1
Fancy Warehouseman	1
Farmers	4
File-cutters	2
Gardeners	2
Glass-cutter	1
,, maker	1
,, painter	1
Glover	1
Governesses	3
Grocers and Assistants	18
,, and Draper	1
Hatter	1
Hosiers	3
Housekeeper	1
Inland Revenue Officers	3
Ironmongers	4
,, moulder	1
,, turner	1
Jacquard Power - loom weaver	1
Joiners	5
Labourer	1
Land-agent	1
,, and Surveyors	2
Letter-carriers	5
,, sorter	1
Lithographers	3
Lithographic printer	1
Locomotive-fireman	1
Machinists	2
Manager of works	1
Manufacturers	2
Masons	2
Measurers	2
Mechanics	11
Mechanical Draughtsmen	2
,, Engineers	3
Medical Students	3
Mercantile Assistant	1
Messenger in H.M. Record Office	1
Miller	1
Mill-piecer	1
Minders	2
Miners	5
Missionary	1
Opticians	2
Overlookers	5
Painters	2
,, and Paperhanger	1
Paper-ruler	1
Passepartout-maker	1
Pattern-drawers	5
,, makers	2
Pawnbrokers	3
,, Assistant	1
Pen-blade grinder	1
Pianoforte-maker	1
Piecer	1
Plasterer	1
Plumbers	2
Police-constable	1
Presser and stamper	1
Printers	3
Prison-officer	1
Puddler	1
Pupil-teachers	31
,, and Organist	1
Railway Agent	1
Reporters	2
Ropemaker	1
Saddler	1
Saddler's Ironmonger	1
Salesmen and Assistants	5
Sawyer	1
Scholar	1
Schoolmasters	16
,, mistress	1
Shingler	1
Ship-broker	1
,, draughtsman	1
Shipwrights & apprentices	20
Shopmen	4
Soap maker	1
Stationer	1
Stationers' Assistants	3
Students	2
Surveyors	3
,, Assistant	1
,, & House-agent	1
Table-blade forger	1
Tailors and Drapers	2
Taper	1
Teachers (and Assistants)	16
Tea-dealer	1
Teller in Stamp Office	1
Tenter	1
Timekeepers	2
Tin-smith	1
Tobacco - manufacturer	1
Tobacconists	2
Traveller	1
Turners	2
,, and Stove-fitter	1
Tutor	1
Usher	1
Valuer's Assistant	1
Warehousemen and Assistants	45
Watchmakers	3
Weavers	12
Wheelwright	1
Whip-maker	1
Wine-merchant	1
Wire-worker	1
Wood-carver	1
Wool-sorters	7
,, trade, in the	1
Wright	1
Writer	1
Undetermined or not given	24

This year, for the first time, a considerable number of Candidates have taken advantage of the clauses enabling them to avail themselves of the Examinations without being members of Institutions in direct Union with the Society of Arts. Forty-nine Candidates have been examined at the 2s. 6d. fee, and three at 10s. 6d.

In the programme, the importance of obtaining a uniform value for the "passes" at the previous Examination has always been pointed out, and the Local Boards have been invited to "enter into unreserved communication" with the Society on this point. This becomes of still greater importance when the Local Boards extend their action to the examining persons under sixteen years of age, and granting certificates on the authority of such Boards. There are several Educational Unions, embracing large districts, where Examinations of a lower character than those of the Society are held, and which grant certificates, and a proposition has, during the year, been laid before the Society for the purpose of securing, as far as possible, a uniform standard of value for the certificates issued by these Unions. In conformity with this view, a meeting of Representatives from several of such Unions took place in the Society's Rooms, when it was resolved that a Central Committee of such Unions as were in, or might hereafter enter into connection with the Society, should be formed, consisting of two representatives from each such Union, four members of the Council of the Society, and the Chairman of the Board of Examiners. The duty of this Committee is to prepare sets of Papers suited for these Examinations, which the Society has undertaken to print for the use of such Unions as might require

them. This system will come into operation during next year, and it has been determined that those who obtain a certificate of the higher grade at these Examinations, if accompanied with a return of competent knowledge in the special subject in which they seek to be examined, shall be received as qualified to attend the Society's Final Examination, without the necessity of passing the ordinary "previous" Examination.

Should the Local Boards, for the purpose of having a greater uniformity in their "passes" in the Previous Examination, decide to take advantage of the Papers, and the system thus established, it will be perfectly open to them to do so, but unless they desire it, the action of the Central Committee in no way whatever interferes with their proceedings. This subject will, however, be brought before the Conference for consideration and discussion.

The legal position of the Institutions as regards the Dramatic Authors Copyright Acts, and the right to hold entertainments of a dramatic character within their walls, has been brought under the notice of the Council, who have appointed a Committee to consider and report upon it. In the mean time the Committee would be glad to receive from Institutions a statement of the circumstances under which they consider themselves aggrieved by the provisions of the Acts of Parliament relating to these subjects. Notice to that effect was given in the *Journal*, but only two Institutions have made any communication whatever on the subject; from this it may fairly be inferred, that the law interferes in no very inconvenient degree with the action of these Institutions. The subject, however, is under the consideration of the Committee; it will also be brought before the Conference by the representative of one of the Institutions.

The book orders, so far as I can judge, have been to a greater amount than in former years, but owing to some difficulties which have arisen in continuing the system in the hands of the present agents, the subject is now under consideration and revision.

The number of Institutions now in Union is 295, showing a slight decrease, whilst the business of the Union has increased, thus denoting an increased activity on the part of those Institutions which are connected with the Society.

I have the honour to be,
Gentlemen,
Your obedient Servant,
P. LE NEVE FOSTER,
Secretary.

APPENDIX.

EXAMINERS' REMARKS.

The Examiner in Arithmetic says:—"As a whole, the papers are, this year, very fairly, and in some cases very intelligently done. In most of them, however, there are unmistakeable evidences that greater attention in study has been given to what is merely mechanical than to an investigation and a mastery of the principles by which alone correct results can be obtained. This may be a consequence inseparable from adult classes in which the times for study and the teaching power must necessarily be limited."

The Examiner in Book-keeping by Double Entry says:—"The average character of the papers is rather higher than that of those which have been submitted at any previous Examination, while certain of them evince a thorough acquaintance with the subject. It is satisfactory to find that the number of candidates in this branch continues to advance; thus, in 1861, it is 134 against (the next highest number) 103 in 1860; at the first Examination in 1856 it was only 2."

The Examiner in Algebra reports:—"One hundred and fourteen candidates have presented themselves for examination on this subject, of whom thirteen have entitled themselves to the certificate of the first class, forty to that of the second class, forty-one to that of the third class, and twenty have failed. The candidate at the head of the list has not only done well, but given clear evidence of the possession of superior ability deserving of special cultivation and encouragement; his teachers are most creditable to him. Those next in order have also acquitted themselves very satisfactorily. I can safely affirm that the general character of the answering has been more satisfactory than I was prepared to anticipate. The working out is in general clear and methodical, and gives evidence of careful training. In some few cases, however, results have been stated without the intermediate work having been produced; this is a practice which it is desirable that candidates should be warned against adopting in future examinations."

The Examiner in Geometry says:—"The number of candidates is again fewer than last year, when the number was below that of 1859. The first candidate has considerable ingenuity. Of none of the others can I make any special report. Some, however, who have done but little, exhibit skill and clearness of thought, and seem to have studied the subject with profit to themselves, as they appreciate the logical accuracy of geometrical reasoning."

The Examiner in Mensuration reports:—"There has been a considerable advance upon last year, both in the number of candidates and in the quantity and quality of their work. But while 40 per cent. of the candidates fall below the third class, there is still room for improvement. Some of the failures show that too much reliance is placed upon the memory for the mere rules of working, and but little attention given to the investigation of the rules themselves. It may be well to notice the practice adopted by two or three of the candidates, of omitting their actual work, and giving only the answers to the questions. When the answer is right, the method of obtaining it may possibly have been wrong; and when the answer is wrong, however slight the mistake to which it is due, a very small value, if any, can be applied to it."

The Examiner in Trigonometry says:—"The Examination was creditable, and there was an entire absence of gross errors."

The Examiner in Conic Sections says:—"Although the number of candidates is small, yet the quality of the work quite justifies the Society of Arts in including Geometrical and Algebraical Conic Sections in its subjects for Examination. The knowledge which has been exhibited is accurate, and considerable elegance is shown in the work. The best processes are for the most part employed, and the algebraical results are correctly interpreted. The answers are highly creditable to the candidates."

The Examiner in Navigation and Nautical Astronomy says:—"The result of the Examinations in this subject

seems to show that little or no attention is bestowed on these subjects in our middle class schools for boys, notwithstanding the large number of boys of respectable parentage who annually go to sea. While the lists in many subjects of purely mathematical character are crowded with candidates, there are rarely half a dozen for these. This must arise in some degree from the lack of teachers properly trained to impart the peculiar technical instruction. Should not the training institutions give more aid in a matter of so much national importance?"

The Examiner in the Principles of Mechanics says:—"I am much pleased with the results of my examination of the papers for this year in my subject. They show, on the part of this year's candidates, an increased power both of producing and of applying their knowledge. I am ready to hope that the Examinations of the Society of Arts are encouraging the study of those popular and yet admirable scientific manuals in which the present day abounds. Even those whom I regret to be unable to pass, are not excluded on account of ignorance, but rather on account either of an excessive attention to one question of the paper, to the neglect of the rest, or to a want of clearness in their conceptions, for which thinking, far more than mere reading, is the remedy."

The Examiner in Practical Mechanics writes:—"I have to report that 5 out of 12 candidates have obtained second class certificates in Practical Mechanics. In the present examination many of the questions were well and completely answered, and it was evident that a first-class certificate was within the reach of more than one of the candidates. It becomes, therefore, a matter of regret, that those students who have mastered a portion of the subject, should not, by more careful and extended reading, have attained a higher degree of proficiency."

The Examiner in Electricity, Magnetism, and Heat "has much pleasure in remarking a large increase in the number of candidates, as well as a greater accuracy of knowledge generally manifested by them, as satisfactory indications of the success of the Society's efforts. The three candidates in the first-class have shown a marked superiority over the rest, and their answers indicate a careful study of the subjects."

The Examiner in Astronomy says that a total want of optical knowledge was shown in the papers of the few candidates he had to examine, and an almost entire ignorance of reductions of observations, even of the most ordinary kind, and which are of daily practice in every observatory. At the same time, he observes, that he felt that considerable ability was shown indicative of an extensive reading, but more of astronomical literature with the view of intellectual improvements than of theoretical astronomy, having a practical application. He also adds, that if he might be permitted to express an opinion, he would advise future candidates in Astronomy to read more with a view of its practice, and for the purpose would suggest their making themselves acquainted with Spherical Trigonometry, the Elements of Optics, the use of Logarithms, and the perusal of some of the volumes of the Greenwich Observations.

The Examiner in Chemistry says:—"It appears to me, from the character of the mistakes made by the unsuccessful and by the least successful Candidates, that more attention might be paid to the practical and experimental study of Chemistry. The knowledge of young men would be more sound and useful, if more of it were got in the laboratory."

The Examiner in Animal Physiology says:—"As this is the first occasion on which I have held the office of Examiner in Physiology, I cannot speak as to either progression or retrogression in the general character of the answers given by the Candidates this year. I wish, however, to express my warm approval of the higher papers."

The Examiner in Botany says:—"After examining the five botanical papers that have been submitted to me, I beg to direct attention to the general result, which is not creditable to the candidates who have presented themselves. With the exception of the examinee's placed first, none of the other papers are such as I had hoped to receive, and two are absolutely worthless. As I have stated in my last report, the great object of students seems to be to study botany from books *alone*, a practice which I feel obliged to condemn. Unless book-learning is accompanied by a knowledge of the things spoken of in books, no science has any practical value, and I conceive that it is to practical subjects that the Society of Arts most desires to direct the attention of students. In Botany, although the power of naming plants is a consequence of preliminary study, the two cannot be disunited. It is not enough for a student to answer fairly general questions; he must also show that he understands his science, by answers given after the examination of living plants. So in descriptive botany, which is merely an application to practice of book-learning, though in a different way, we have the only satisfactory test of sound knowledge, for which reason that subject cannot be dispensed with. I should be glad if these views could be communicated to the gentlemen who prepare botanical students for Examination, for I entertain a confident belief that they will agree with me in the opinions I have expressed."

The Examiner in Agriculture reports of the single paper submitted to him, that a higher place would have been awarded to it but for defective replies to several questions on details of farm practice, by which alone, of course, real competency or proficiency in agricultural knowledge must be tested.

The Examiner in Mining and Metallurgy says:—"I consider that the papers, generally, afford evidence of a considerable amount of practical and theoretical knowledge on the part of the candidates, and that one paper in particular, is an exceedingly creditable performance. I would however, remark, that the answers to the questions relative to Mining, are generally more satisfactory than those relating to Metallurgy. In one instance only does the candidate appear to be equally versed in both."

The Examiner in Political and Social Economy says:—"I thought the four papers that were sent in upon the whole decidedly good, all things considered. The fewness of the candidates is the more to be regretted. I would renew my recommendations of last year, as to giving due attention te the historical and statistical part of Political Economy."

The Examiner in Domestic Economy says:—"On this subject only four Candidates have sent in papers, but the questions set have most of them been very creditably answered by all, and in a way which shows they have paid considerable attention to the subject and acquired a knowledge of it, which, if put in practice, may be of great service to them in life."

The Examiner in Geography writes:—"My report upon the Geographical Examination of this year, is one highly creditable to the Candidates. Looking at the entire body of papers by comparison with those of preceding years, my own remarks upon them assume the character of a record of manifest and continuous progress. I am able in the present instance to award twelve First-class Certificates, a number which stands in higher ratio to the total number of papers (44) than on any former occasion; while only four fall below the conditions of a Third-class Certificate. The answers submitted to me this year bear general evidence of definite and systematic work gone through by the writers, with a view to qualification for their task. In the case of a large portion of them, there is a preciseness of expression which shows that the information they embody has resulted from real application, and that the subject has been well thought over and digested on the part of the writer. It would perhaps be assuming too much were we to look upon this characteristic as to any material

TABLE I.—Results of the Examinations of 1861.

Name of Local Board.	No. of Candidates Examined at previous Exam. at Local Board.	No. of Candidates who passed previous Exam. at Local Board.	No. of Candidates Examined at Final Examination.	No. of Candidates who passed Final Examination.	No. of Papers Worked at Final Examination.	No. of First-class Certificates Awarded.	No. of Second-class Certificates Awarded.	No. of Third-class Certificates Awarded.	No. of Prizes Awarded to Candidates.	No. of Prizes Awarded to Local Boards.	No. of Prizes Awarded to Institutions.	No. of Unsuccessful Candidates.
Aberdeen	45	22	24	23	33	1	9	19	...	...	...	1
Aldershot District	10	8	7	5	11	4	3	1	...	...	...	2
Andover	...	...	...	...	...	...	...	...	...	...	...	...
Ashbourne (W.M.I.)	...	...	...	...	...	...	...	...	...	...	...	...
Ashford	3	3	3	3	6	4	...	2	...	...	...	...
Banbury	7	7	7	4	10	1	5	1	...	...	...	3
Barnet	4	4	7	5	8	...	2	3	...	...	...	2
Battersea	2	1	1	1	1	...	...	1	...	...	...	...
Belfast	3	3	4	4	8	1	4	3	...	...	...	...
Birmingham and Midland	11	10	12	10	16	4	5	5	...	...	...	2
Blackburn	7	7	7	2	7	...	...	2	...	...	...	5
Blandford	...	...	1	1	4	1	1	2	...	...	...	...
Bradford (Yorkshire)	13	12	20	18	33	2	9	17	1	...	...	2
Bristol	13	11	10	8	15	1	4	5	...	...	...	2
Brompton (near Chatham)	7	7	8	6	11	1	4	4	...	...	...	2
Bucks and Berks Adult Education Society	2	2	2	2	3	...	1	1	...	...	...	...
Burnley (East Lancashire Union)	8	8	8	7	17	...	3	7	...	...	...	1
Bury, Athenæum	1	1	3	2	3	1	...	1	...	...	...	1
Canterbury	3	3	4	4	6	1	2	3	...	...	...	...
Carlisle (Ch. of E. Institution)	5	5	8	8	12	1	3	6	...	...	...	...
,, (Mechanics' Institution)	1	1	1	1	2	...	...	1	...	...	...	...
,, (Young Men's Christian Association)	7	7	6	6	7	2	1	4	...	...	...	...
Carshalton	...	...	1	1	2	1	1	...	1	...	...	...
Chelmsford	5	5	5	4	7	...	2	4	...	...	...	1
Croydon	2	1	1	1	2	...	...	1	...	...	...	...
Darlington	5	5	5	4	6	1	1	3	1	...	...	1
Deptford	9	6	6	5	7	2	3	1	...	...	...	1
Derby	12	9	9	6	21	3	6	2	...	...	...	3
Devonport	15	14	14	14	44	10	19	10	2	...	...	...
Glasgow (Andersonian University Popular Even. Classes)	40	40	27	21	33	6	7	12	1	...	...	6
,, (Athenæum)	20	19	26	23	31	11	12	5	...	1	1	3
,, (Institution)	51	38	27	25	28	7	14	5	2	1	1	2
,, (Mechanics' Institution)	65	50	52	46	66	24	19	15	5	...	2	6
Halifax (M.I.)	5	5	9	9	11	1	6	4	...	1	...	...
,, (W. M. College)	16	10	13	11	16	2	6	6	...	...	...	2
Hertford	3	3	5	4	6	3	1	1	...	...	...	1
Hitchin	2	2	6	5	6	...	3	2	...	...	...	1
Holmfirth	4	3	3	3	5	...	2	3	...	...	...	...
Ipswich	11	10	12	11	16	4	3	8	...	...	...	1
Leeds (Yorkshire Institution)	42	39	35	24	55	7	14	12	2	...	...	11
,, (Young Men's Christian Assoc.)	33	30	29	26	39	15	10	10	4	...	2	3
Leicester (Church of England Inst.)	5	5	8	6	17	1	3	4	...	...	...	2
Liverpool	13	12	13	8	18	...	1	9	...	...	...	5
London (M.I.)	9	7	14	14	17	10	4	2	2	1	1	...
,, (Polytechnic Inst.)	16	9	10	8	11	1	1	6	1	...	...	2
,, (M. Evening Classes, Sussex-hall)	18	16	24	21	33	15	9	3	5	...	3	3
,, (St. Stephen's, Westminster)	13	13	13	8	20	4	3	4	...	...	...	5
,, (Clerkenwell)	3	1	1	1	2	1	1	...	1	...	...	...
,, (St. Thomas, Charterhouse)	2	2	2	1	2	...	...	1	...	...	...	1
Louth	1	1	2	2	3	...	1	1	...	...	...	...
Lynn (King's)	1	1	1	1	1	...	...	1	...	...	...	...
Macclesfield	34	19	14	2	17	...	2	1	...	...	...	12
Manchester (M.I.)	30	22	33	25	49	5	13	13	...	...	...	8
Middlesbro'	5	5	5	5	7	2	2	3	...	...	...	...
Newcastle (Church of E. Inst.)	4	4	5	4	12	4	3	3	...	...	...	1
,, (Mechanics' Inst.)	6	6	6	6	14	...	5	7	...	...	...	...
Nottingham	11	11	10	9	13	2	4	4	1	...	...	1
Oldham	6	6	5	5	9	...	2	3	...	...	...	...
Paisley	10	8	7	7	8	1	1	6	...	...	...	...
Pembroke Dock	8	8	8	8	19	1	6	7	...	...	...	...
Peterborough	2	2	2	2	4	...	1	3	...	...	...	...
Portsmouth	...	...	2	2	4	2	1	1	2	...	...	...
Richmond	5	4	4	3	7	...	2	3	...	...	...	1
Rotherham	5	5	8	7	12	...	...	8	...	...	...	1
Salford	24	14	12	6	13	3	...	3	...	...	...	6
Selby	2	1	3	3	3	...	1	2	...	...	...	...
Sheerness	1	1	1	1	1	...	1	...	...	...	...	...
Sheffield	13	13	22	18	26	3	8	10	...	...	...	4
South Staffordshire Union	70	48	...	...	...	...	...	...	...	...	...	...
Bilston	...	...	7	7	11	1	2	7	...	...	...	...
Cradley	...	...	1	1	1	...	1	...	...	...	...	...
Dudley	...	...	5	5	7	1	3	2	...	...	...	...
Smethwick	...	...	13	12	19	6	4	7	3	...	...	1
Stourbridge	...	...	5	3	9	...	3	4	...	...	...	2
Walsall	...	...	5	4	6	...	3	2	...	...	...	1
Wednesbury	...	...	3	2	4	...	...	2	...	...	...	1
West Bromwich	...	...	6	4	8	2	1	3	...	...	...	2
Wolverhampton	...	...	11	9	15	9	1	3	...	...	...	2
Wakefield	5	4	5	4	12	5	5	1	...	...	...	1
Warminster	1	1	1	1	2	1	...	1	...	...	...	...
Waterford	8	8	4	2	4	2	...	...	...	...	...	2
Wigan	10	10	13	11	16	6	3	5	...	...	...	2
Wilton	1	1	1	...	1	...	...	...	...	...	...	1
Worcestershire Union	2	2	2	2	3	...	...	2	...	...	...	...
York	3	3	5	4	5	3	1	...	...	...	...	1
Total	839	684	750	617	1079	216	287	339	34	4	10	133

TABLE II.—Return of the Number of Papers Worked in each Subject in the Four Last Years, with the Result for the Year 1861.

SUBJECTS.	1858.	1859.	1860.	1861.				
				No. of Papers Worked.	No. of First-class Certificates.	No. of Second-class Certificates.	No. of Third-class Certificates.	No. of Papers in respect of which no Certificate was Awarded.
Arithmetic	159	232	263	336	55	64	114	103
Book-keeping	48	84	103	134	60	47	26	1
Algebra	74	82	77	114	13	39	42	20
Geometry	53	} 45 {	27	17	1	5	9	2
Mensuration	44		11	43	1	9	15	18
Trigonometry	27	17	15	8	2	1	3	2
Conic Sections	14	4	5	4	1	1	1	1
Navigation, &c.	5	...	2	3	2	1	...	...
Statics, Hydrostatics, &c.	14	17	...	...	...	...	...	...
Principles of Mechanics	...	...	7	12	...	1	6	5
Practical Mechanics	8	7	7	12	...	5	5	2
Magnetism, &c.	4	5	11	18	3	5	6	4
Astronomy	5	...	6	4	...	2	2	...
Chemistry	13	28	28	36	9	6	13	8
Animal Physiology	6	2	5	5	2	1	1	1
Botany	2	2	11	5	1	1	...	3
Agriculture	...	...	...	1	...	...	1	...
Mining and Metallurgy	...	...	...	7	2	1	2	2
Political and Social Economy	3	14	7	3	...	3	...	...
Domestic Economy	...	...	...	4	1	3	...	...
Geography	...	28	34	44	12	16	12	4
Descriptive Geography	29	...	...	...	...	...	...	...
Physical Geography	17	...	...	...	...	...	...	...
English History	43	38	43	46	13	18	13	2
English Literature	33	30	39	37	11	13	8	5
Logic and Mental Science	...	...	12	5	2	1	2	...
Latin and Roman History	12	18	10	22	7	6	5	4
French	68	87	69	79	10	15	26	28
German	13	14	16	5	2	2	1	...
Free-hand Drawing	37	...	...	40	...	10	10	20
Mechanical Drawing	34	...	...	5	...	1	2	2
Music	...	12	13	30	6	10	14	...
Totals	765	766	821	1,079	216	287	339	237

extent, the result of inducements to geographical study, and suggestions for the method of its pursuit, afforded in connection with the Society's Annual Examinations; but if the latter may be regarded as having conduced towards it, in even partial measure, I shall feel that they have rendered essential service to Geography. The more enlarged view of the aim and scope of geographical science, which has been happily obtained within recent years, and which is fast gaining ground, has been too often accompanied by an inclination on the part of the learners to neglect unduly the more elementary (and, we may readily allow, the less attractive) details of precise knowledge proper to the subject. This is to be contended against as an evil, for the truths of Physical Geography—using that expression in its fullest and highest meaning—can only be adequately appreciated by those who have thoroughly mastered the humbler details of the study. I have nothing to add to the suggestions on this head made in connection with previous reports. The papers of this year supply satisfactory evidence of progress in the right direction, and we may reasonably anticipate yet further evidence of it upon future occasions."

The Report of the Examiner in English History is as follows:—" The average excellence of the papers on English History this year was very creditable to the candidates. The answers were often full and sound, and the fatal mistake of introducing irrelevant matter was rarely made. Students, however, will do well to remember that they place themselves at a disadvantage either if they attempt to answer the whole paper, or if they confine themselves to two or three questions. In the first case they are unavoidably meagre; in the second it is difficult to compare them with others. Several failed this year from having learned their work out of different text books to those recommended. If this is ever done, the student should be careful to see that he chooses a standard author. In the cases alluded to it was evident that some worthless popular manual had been preferred on account of its shortness. Above all, the student must accustom himself to think; a little reflection would have saved several candidates from the mistake of ascribing the Spanish Armada, in 1588, to Philip's anger at Elizabeth's rejection of his hand thirty years before."

The Examiner in English Literature says:—" The candidates in this subject have acquitted themselves in a very satisfactory manner. I am much gratified to observe that there has been a strongly marked improvement in the papers of each succeeding year since I first undertook to examine on the subject. On the present occasion I have raised the standard of classification, but, as you will see, the first-class is more numerous than it has ever been before. A large proportion of the candidates show a very

accurate acquaintance with the text of the authors they have selected, and their answers are, for the most part, sensible and well expressed. The hints bearing on these points, which were given in the Programme and report of last year, have evidently produced a good result."

The Examiner in Logic and Mental Science says:—"The addition of 'Mental Science' to the Logical Examination has somewhat diminished the number of candidates in this department. The work done is good on the whole. There is still the same deficiency in the practical examination of logical arguments, which is the best test of proficiency in logic. The rules had been learnt, but, for the most part, the candidates have had little practice in applying them."

The Examiner in Latin and Roman History says:—"The average of the work this year remains very nearly what it was last year. The parsing is a little better; the translation is not quite so good. The candidates do not take pains enough to make their translations English."

The Examiner in French says:—"The papers are on the whole good, and I am glad to say the proportion of successful candidates is, if I am not mistaken, slightly increased as compared with past years. That 51 out of 79 candidates should be found deserving of a certificate for French is, I think, very satisfactory. There is still, however, too large a proportion of third-class certificates, and several candidates in that category have so far partially failed, because they aimed too high, and would compete for the first-class certificate, thereby damaging the chance they had of a second-class. Still more unwise have been some candidates in attempting to answer the three different sets of questions, regardless of the printed directions, and of the warning more than once given by the Examiners not to attempt too much, but to bear in mind that it is quality and not quantity that secures success."

The Examiner in German says:—"I do not know whether there has been a general falling off this year in the number of candidates for examination at the Society of Arts, but I must observe that in my department the diminution has been considerable. This may be owing to the greater difficulty of my paper, or to a greater strictness in the Preliminary Examinations. But, whatever the cause, the weeding has produced better work; so that out of the five candidates I have had to reject none, and have been able to award two first and two second-class certificates. I would, nevertheless, recommend to both teachers and students of the German language, to cultivate translations into German more assiduously than composition; because in the latter kind of exercise the student employs only such words and phrases as he is already familiar with; while in the former he is often driven into new regions of expression, which are calculated to enlarge his proficiency."

The Examiner in Free-hand Drawing says:—"I have recommended, comparatively, a small number of certificates to be given for Free-hand Drawing. The difficulty that some of the candidates have in making the necessary drawings for this examination evidently proceeds from the mode of teaching, which is still followed in some schools. I refer particularly to the practice of copying from the flat, and not drawing from nature or from the round. The similarity in style of many of the sets of drawings shows that they come from the same schools, and whilst, in some districts, the candidates appear unable to make any of the drawings, in other districts all the subjects have been completed. You are aware that I have not the slightest means of judging from whence the different drawings are sent. I am sorry to have to reject some works owing to the candidates not having had time to finish even one of the four subjects that were given."

The Examiner in Geometrical Drawing says:—"I regret that the Examination in Practical Geometry has not been as satisfactory as could be wished; but, it is but just to the candidates to state, that the failure is not attributable to want of effort on their part, but, in my opinion, to the want of good elementary works on the subject to serve as text-books. This observation applies more especially to practical solid geometry. The common opinion that 'Euclid's Elements' contain all that is essential, as well as all that is fundamental in the science, is very prejudicial to an effective knowledge of geometry as applicable in the arts of construction. It is, possibly, to a consciousness of this deficiency in theoretical knowledge, that the very small number of candidates in this subject is to be attributed."

The Examiner in the Theory of Music says:—"The Music-papers are much better than those of last year, and very much better than those of the year before it. There is also an increase in the number of candidates."

TABLE III.

This Table shows the ages of the 809 Candidates from whom return papers were received. Of these, 750 underwent the Final Examination.

Age.	No. of Candidates.	Age.	No. of Candidates.
16 ...	... 103	30 ..	... 10
17 ...	... 108	31 ...	... 7
18 ...	... 106	32 ...	... 3
19 ...	... 91	33 ...	... 3
20 ...	... 102	34 ...	... 5
21 ...	... 65	35 ...	... 2
22 ...	... 58	36 ...	... 5
23 ...	... 45	38 ...	... 3
24 ...	... 31	39 ...	... 2
25 ...	... 15	40 ...	... 2
26 ...	... 15	42 ...	... 1
27 ...	... 6	44 ..	... 1
28 ...	... 15	49 ...	... 1
29 ...	... 4		

The Chairman having introduced the subject of the

Programme of the Examinations for 1862,

Mr. Harry Chester said this might be a convenient moment to state that the Council proposed to issue a programme for the next year similar in almost all respects to that of last year, the necessary alterations of course being made to suit the period when Easter would fall. The only alterations they proposed were—first, that teachers should be excluded from competition for the money prizes offered by the Society, but that they should be admitted, as heretofore, to examination for certificates. It would be seen in the list of prizes in the present year that a considerable proportion had been gained by teachers. He thought the same principle by which students for the learned professions were excluded, ought to apply in the case of professional teachers generally, in order that the prizes might fall into the hands of those classes for whom the system of examinations was more particularly designed. It was, however, desirable, he thought, that there should be some qualification of the term "teacher." For instance, a person who taught music only ought not to be disqualified from competing for the prize for chemistry; and it was proposed that schoolmasters, or persons generally engaged in teaching, should not be allowed to compete for the prizes. Another alteration proposed was as to the prizes. The Conference were aware that the Society had offered in each year prizes of £5 and £3 for the first and second best candidates in each of the subjects of examination. The funds appropriated to that purpose, he was happy to say, had been extended by the subscriptions of friends, and it was proposed that in future instead of that amount being placed to the general fund, the subscribers should have the option of contributing what they thought fit for special prizes in particular subjects. For instance, Mr. Dilke proposed to give a special prize in English Literature; another gentleman would offer a special prize in Political Economy; another gentleman

had announced his intention of offering one for the subject of Agriculture. He trusted that prizes would also be offered for Domestic Economy, as by that means additional stimulus would be afforded. Another point in which some slight alteration was proposed was with regard to the Preliminary Examinations. They had heard, from the reading of the report, of the formation of a Central Committee. That subject would come on for discussion separately, and he alluded to it now merely as affecting the Examination Programme. The proposition of the Council, at the instance of the Central Committee, was, that in any case in which any difficulty was found by the Local Boards, they should not be required to conduct the Examination in the special subject, but that they should obtain a certificate from a competent person that the candidate was fit to be examined in it by the Society of Arts.

Mr. Stephen Baldock (Barnet Institute) was happy to hear that so large a number of candidates had presented themselves in free-hand drawing, although no prize was awarded. It was at his suggestion, at the last Conference, that that subject was placed upon the programme, and he had been requested to propose another on this occasion, viz., Penmanship, and that a prize should be offered for it.

Mr. Chas. Mercier (Salford Working Men's College) seconded the proposition, and a recommendation to the Council to that effect was agreed to.

Mr. Barnett Blake (Yorkshire Union of Mechanics' Institutes) thought the suggestion of Mr. Chester, with regard to the exclusion of teachers from competing for the Society's prizes, was not sufficiently definite. It was the complaint of pupils that they were opposed by their own teachers, and the prize list showed a large proportion that had been carried off by the teachers.

Mr. Chester intended to make a distinction in the case of a person who was a teacher of any special subject only, such as music, and those who were educational teachers generally. He thought, in the former case, a person ought not to be prohibited from competing for the prize on a totally different subject, such as chemistry or astronomy, the one having no connexion with the other.

Mr. Barnett Blake remarked that teachers had educational advantages which could not be enjoyed by persons who were engaged during the day in handicraft.

Lord Lyttelton (South Staffordshire Union Local Board) said that the competition of teachers for the prizes had given a great deal of dissatisfaction in the country.

Mr. Henry Poppleton (Farnham Young Men's Association) thought the exclusion of teachers without distinction would inflict a hardship upon persons who were without means, and wished to take up the profession of teachers. To such the prizes, in addition to the certificates, would be of great value.

The Chairman said the same remark might apply to assistant masters in schools. He, however, thought the feeling of the Conference had been sufficiently expressed that it was expedient to admit teachers to compete for certificates but not for prizes.

Mr. John Mayer (Glasgow Athenæum) suggested, that although teachers were excluded from competing for prizes, they should, nevertheless, be awarded their proper places in the list of certificates. If the certificates of the teachers were higher than those of the persons who gained the prizes, this ought to be stated in the examination return.

Mr. Chester remarked that the object of these examinations was to assist and encourage those who were to a great extent self-taught. If they brought into competition with them those who were their teachers they were put to great disadvantage. The teachers would be allowed to try for certificates, inasmuch as there was no competition for them, and the granting of a certificate to a schoolmaster was no disadvantage to any other person who also gained a certificate. His own opinion was that teachers ought to be content with a certificate of the first class, whilst the most successful amongst the other candidates would come out as prizeholders.

Mr. Barrow Rule (Aldershot Local Board) thought the matter might be simplified by excluding from competition for prizes teachers who received payment for their services from the parents of the pupils, or from the masters in whose service they acted. There were pupil teachers who did not receive payment from masters, and he thought they ought not to be excluded from the competition for prizes.

The Chairman remarked that the class of persons alluded to by the last speaker were paid in two modes; first, they were taught without cost to themselves, and, in the next place, they received a money payment from government.

Mr. Barrow Rule added that many persons were preparing themselves to become teachers who would be glad to avail themselves of the prizes, but they were not yet in the position of teachers in the receipt of payment for their services, but still they must be classed as teachers, inasmuch as their duties were analogous.

Lord Lyttleton confessed there was some difficulty on this point. He thought they could not justly exclude those who were preparing to become teachers. If it was an advantage for them to compete for the prizes he thought they ought not to be excluded from doing so. If he understood the position it was this:—They had competitive examinations for prizes of substantial value. From that competition a certain class was to be excluded; and if those who were allowed to attend as prize candidates attained that substantial reward, he could not see that they were damaged by the fact being known that certain persons who had superior advantages of education were above those who obtained the prizes in educational attainments. He suggested that there should be two distinct lists—one of certificates to teachers, and another of prize candidates.

Mr. Chester said they did not place any candidates except the two first.

Lord Lyttelton would put in separate classes those who happened to be above the prizemen.

Mr. Chester thought that would depreciate the value of the prizes.

Mr. J. Marshall Carpenter (Sussex Hall Evening Classes) thought the difficulty would be obviated by directing that teachers beyond a certain age should not be eligible to receive prizes. This would allow those at present studying for professional teachers to receive prizes.

Mr. H. E. Montgomerie (Deptford Local Board) thought, in defining the term "Teacher" some limitation ought to be made. An officer who occupied his time in teaching fencing was literally a teacher, and the rule might disqualify such a person for competing for the prizes, although he came forward for a prize in literature.

Mr. S. Redgrave said it would be difficult for the Council to define the term "teacher." He thought it had better be left to the Local Boards to determine, without regard to the standard of age.

Mr. Robert Hayles (Winchester Mechanics' Institution) considered that some youths of fifteen or sixteen years of age were as competent to compete for prizes as working men at the age of twenty-one.

The Chairman thought the Council were sufficiently in possession of the views of Conference on this subject, and he could promise that they should receive full consideration.

Mr. Mayer suggested that every candidate should be put in his proper place, whether he obtained a certificate or a prize, according to the number of marks gained.

The Chairman said that would not only increase the work of the Society enormously, but was contrary to the principles on which these examinations was established.

Mr. T. J. Pearsall (London Mechanics' Institution) concurred in the unfairness of teachers competing with their own pupils for prizes. He also concurred in the opinion that age ought not to form an element in the consideration of the subject.

Mr. Mercier said, as the art of Phonography was be-

coming a part of education in several of the Working Men's Colleges and Literary Institutions of the country, he begged to propose:—

"That in the opinion of this Conference the acquisition of phonographic knowledge should be encouraged, and that certificates for proficiency therein should be granted by the Society of Arts."

He mentioned that in his own Institution at Salford there were from 30 to 40 students in this art, and he thought it worthy of being recognised by the Society.

Mr. Chester suggested that there would be a difficulty in conducting the examination, and in testing the proficiency of the candidates.

Mr. J. Marshall Carpenter seconded the proposition, having recognised the great benefits which phonography conferred upon all classes.

Mr. Barnett Blake concurred in the difficulty of testing the proficiency of the candidates.

Mr. T. A. Reed (London Mechanics' Institution Local Board), as a practical phonographer, thought there would be no difficulty in that respect. In his own Institution they had a phonographic class, and awarded prizes. The test of proficiency would be ascertained by the examination of the writing by persons acquainted with the art, a statement being also given of the time taken in writing the matter submitted for examination. Speed in writing was an element that could not be excluded.

Several other representatives expressed themselves in favour of the proposition, but admitted there were difficulties in carrying out the examination.

Mr. Mercier replied to the objections raised; and, upon a show of hands, the proposition was negatived.

The Chairman then read the next subject upon the paper, viz.:—

The Minutes of the Meeting which, at the suggestion of the Southern Counties Education Society was held here, to establish the "Central Committee of Educational Unions in connexion with the Society of Arts."—[See *Journals* of February 22nd and April 12th.]

The Secretary read the proceedings establishing the Central Committee, and the proposed scheme for carrying out the objects.

The Hon. and Rev. Samuel Best (Southern Counties Adult Education Society) said he had been deputed to introduce this subject to the Conference, and he had little to say upon it, more than what they had heard read. He believed there would be no difference of opinion as to the value if they could carry it out—and he believed they could—of promoting uniformity of action and a fixed standard for the elementary examinations. The difficulty hitherto had been felt of carrying on the education of young persons from the time they left their schools till the period when they became eligible for the Society of Arts Examinations. It was to meet this gap in the educational system that the Society he represented—the Southern Counties Union—and other societies had instituted elementary examinations for such young persons. These Societies had conferred certificates in many instances, but they could not be blind to the fact that those certificates would be of much greater value to the possessors of them if they represented one uniform standard of acquirement, and had the sanction of some Central Board. The Society of Arts had endeavoured, through the Local Boards, to establish a system of elementary examination for young persons up to the age of 16 years, after which they would be admissible to the Society's own examinations. With regard to the composition of the Central Committee, as it at present stood there were no representatives of the Local Boards on it, and for his own part, representing, as he did, the Southern Counties Union, he had no desire to see the Local Boards unrepresented on that Committee. The object was to establish one uniform system of elementary examinations, and if the Local Boards desired to join in that work, he thought they ought in some way or other to be represented on the Central Committee. Up to the present time he believed the representation of Local Boards on this Committee had not been proposed in any feasible way. It would not be practicable to have a representative from every one of the Local Boards, but it was the opinion of all who had met under the present constitution of the Central Committee, that if any plan could be devised by which Local Boards could be fairly represented, it ought to be adopted, and the Committee would be delighted to see them there. He would leave the matter in their hands, and would rather reply to any objections hereafter.

Mr. Barrow Rule (Aldershot Local Board) said he was authorised by the Institution he represented to suggest a plan for obtaining a representation of the Local Boards upon the Central Committee of the Educational Union. It was this,—that the Local Boards should each forward a name to the Secretary of this Society; that those names should be printed in a list, and a copy sent to each Local Board, who should from such list select the names of a dozen persons whom they approved to represent the Local Boards on this Committee. The persons having the greatest number of votes in their favour to be those finally selected.

The Hon. and Rev. S. Best was glad to find that no objection was raised to the Committee itself. As a simpler plan of choosing representatives of the Local Boards, he would suggest that four or six members should be chosen annually by the Conference.

Mr. Barrow Rule thought it unfair to the Local Boards that they should be called upon to examine candidates upon the papers which they had no part in preparing. He highly approved of the Central Committee, but he thought the Local Boards ought to be represented upon it. His was, as yet, a young board, which could hardly expect to have a representative, but he was contending for the principle now advocated.

Mr. Mercier could not see anything fairer than that the Conference should elect the representatives of the Local Boards on the Central Committee. He thought such a course would save a vast amount of trouble. He approved of the plan—that elementary examination papers should be prepared by the Central Committee—as he thought it fairer to all the Institutions that the same examination papers should be used throughout England, and that it should not be left to the various Boards to say whether they would adopt the papers or not, but that they should accept those prepared by the Central Committee. They would then arrive at a fair test of the skill of all the candidates. In some places the Local Boards were very stringent; in others they were more lax. Before the latter, prizes might be easily obtained, whilst before the former, persons, equally proficient, might be turned back; but if a uniform system prevailed, it was a fair test to all alike.

Mr. Chester agreed as to the advantages likely to reresult from all the Local Boards adopting the same elementary examination papers. There was a common objection that young examiners sometimes put the questions too high. One of the objects of this Central Committee was, that the examinations should be truly elementary, and not above the heads of the persons for whom these examinations were intended. At the same time, they could not make the use of these papers compulsory, although he had no doubt that it would be seen, after a time, that the advantages of them would be so great, that the majority of the Local Boards would adopt them. It was not to be supposed that the Council or Central Committee desired to do anything which could damage the Local Boards, but, at the same time, he thought it desirable they should be represented in the Central Committee. There was some difficulty in deciding how the representation on this Committee should be carried out. Two modes had been proposed for effecting this—one had been brought forward by Mr. Barrow Rule, and another

had been suggested by Mr. Best. Of the two plans he thought that of the latter the preferable one.

The Chairman said he thought he might take it as the unanimous sense of the meeting "that it is desirable that Local Boards be represented on the Central Committee," and he suggested that the first point to be decided was the number of representatives to be placed on it.

Mr. William Hawes suggested that the Conference should first decide upon the mode of choosing the representatives of the Local Boards. By following the plan suggested by Mr. Barrow Rule, it was probable that men would be elected who had no previous knowledge of each other, and who might come upon the committee with an entirely new set of views, by which all continuity and uniformity of action, the attainment of which was the real object of the Council, would be destroyed. On the other hand, if they selected the representatives at the Conference they had the opportunity of choosing those who, by their attendance, had shown themselves interested in the work they had in hand, and in whom the whole body would have confidence that they were fit persons to discharge the duties entrusted to them. He did not think it desirable to have too small a number of representatives, for many might not be able to attend. He should support the suggestion that the selection of the representatives be made by the Conference.

Mr. Barnett Blake thought that the plan proposed by Mr. Barrow Rule was full of practical difficulties. He seemed to have mistaken the purposes for which this committee had been established. With regard to the selection of the representatives of the Local Boards, they had a wide field around them from which to choose. After commenting upon the plan proposed by Mr. Barrow Rule for the election of the representatives, Mr. Blake concluded by moving the following resolution :—

"That each Local Board agreeing to accept the papers and act upon the system of the Central Committee, should annually send in a name to the Central Committee, and from a list so constituted the Conference shall elect six as representatives to act on the Central Committee, and that for the present year the six be now elected by the Conference."

The Hon. and Rev. Samuel Best preferred that suggestion to that of Mr. Barrow Rule, because he thought the latter would entail an immense amount of trouble without arriving at the result they wished. He thought the selection of six representatives, elected by the Conference, a more simple plan than either.

Mr. Barrow Rule said he was not aware that the Board he represented had any objection to that mode of election.

The Chairman remarked that the plan was experimental, and for the present year he thought that the Conference should make the selection of representatives.

The resolution was then put to the meeting and carried.

The Chairman then called upon the members to make their selection.

Mr. Barrow Rule, Mr. Montgomerie, Mr. Adams (Secretary of the Shrewsbury Local Board), Mr. F. Talbot, and Mr. Newmarch (Notting-hill Working Men's Association), were severally proposed and elected as representatives; and after some conversation it was agreed that the sixth representative should be chosen by the Central Committee.

Mr. Barnett Blake thought it desirable that publicity of these proceedings should be given to the Institutes throughout the country. In his own union he had no doubt handbills would be sent round to every Institution.

The Chairman said he assumed that the plan of the Central Committee generally, in other respects, was approved of by the Conference. The scheme of elementary examination, as arranged by the Central Committee, might therefore be regarded as settled.

The Chairman introduced the next subject on the agenda as follows:—

In Connexion with this Subject, the Conference will be invited to consider whether it is desirable to pass any Resolutions suggesting the further grouping of neighbouring Institutions in County or District Sub-Unions.

Mr. Barnett Blake moved the following resolution :—

"That in any county or district where there is at present no Union of Educational Institutes it would be desirable to establish one, provided an Institution in a central town will invite the co-operation of the other Institutes in the locality, and afford a room for the accommodation of the Central Committee meetings; and that the Council of the Society of Arts be requested to undertake the preliminary organisation of the Local Union wherever there is a prospect of establishing it on a permanent footing."

This (Mr. Blake remarked) would give such Institutions an opportunity of forming Unions for the purposes of examinations.

Lord Lyttelton seconded the resolution. He had known cases in which neighbouring counties had joined together for this purpose, but he thought, generally speaking, a county was sufficient area for those unions.

Rev. J. Alton Hatchard (Hastings Mechanics' Institute) heartily supported the resolution. It was of great importance, and he had frequently expressed his opinion on the subject in his own locality. He thought the Institutions would be much strengthened by such a plan, and it would be the means of assisting Institutions in neighbouring towns.

The resolution was passed unanimously.

The next subject introduced was as follows :—

The Council will communicate to the Conference the Resolutions passed on the 6th of February, and published in the Journal of the 15th of that month, in favour of the establishment of District Museums, and the systematic circulation of interesting objects for temporary exhibition therein.

The Secretary having read the resolutions,

The Chairman suggested that, in the absence of Mr. Henry Cole, they should proceed to the consideration of the next subject.

This was agreed to.

The Council will call attention to its recent communications with the Company of Painters' Stainers, [see *Journal* of 26th April] and will invite the Conference to consider whether any Resolutions should be passed in favour of Competitive Exhibitions of Works of Skilled Labour.

The Secretary read the communication referred to, and stated that the exhibition had been held, and medals had been awarded. The report, however, had not yet been received.

Mr. Barnett Blake, to carry out the intention expressed in the programme, would move :—

"That as competitive exhibitions of works of skilled labour have a powerful tendency to encourage improvement in manufacturing industry, and at the same time to promote mental cultivation, it is desirable that such exhibitions should be held in connexion with the principal provincial Institutes, wherever practicable, as well as in the Metropolis, and that Schools of Science and Art be specially invited to co-operate therein."

Mr. Chester said he had drawn up a resolution to the same effect, but as he liked Mr. Blake's better than his own he begged to second it. There could be no question as to the expediency of holding such exhibitions if possible. That which had been done by the Painters' Company in their own particular art might be done by the hardware manufacturers of Birmingham, the cutlers of Sheffield, and the shoemakers of Northampton, and various other branches of skilled labour, and whilst they did all they could to stimulate intellectual cultivation, they ought not to put out of sight the cultivation of the eye and hand. He thought the Union of Institutions might be fairly invited to consider this subject, and hold such Exhibitions, or promote their being held. It would seem that the mayors

and corporations of large towns would be the proper persons to start such a movement, but without at present going into the details, he begged to second the resolution affirming the expediency of having such exhibitions, and inviting schools of science and art to co-operate.

Mr. Akroyd (Working Men's College, Halifax) said the object was a most desirable one, but it opened a very wide and large field, and embraced the produce of skilled labour in every department, and unless a proper classification were adopted it would bring together such a miscellaneous assortment that no beneficial results would be produced by such exhibitions. He suggested that it should be referred to some select committee to draw up a plan for an exhibition—first in London and afterwards in the provinces. By that means important results might be realised. They knew that ingenious workmen in the country were fond of showing the productions of their skill, and without such exhibitions as these such talent might never be revealed. He was at the same time satisfied that unless such exhibitions were properly organised it would be a waste of time to hold them. He suggested that it be referred to a select committee to report, and they could not do better than place Mr. Chester and Mr. Blake upon that committee.

Mr. Wm. Hawes inquired whether that was moved as an amendment.

Mr. Akroyd replied in the negative.

Mr. Wm. Hawes went on to remark that there could be no doubt exhibitions in skilled labour must have an important effect in the education of the eye and hand of the men who executed the work, and there was no more important result of such exhibitions than in showing the working man what others around him were capable of doing. He agreed with Mr. Akroyd that the resolution was a very wide one as it stood. They, as a Society, could do no more than declare that it was their wish to encourage such exhibitions. The resolution spoke of competitive exhibitions. He questioned whether it was politic to do so, because without being competitive they might be equally important in obtaining the end in view. He thought they had better raise the question by a general resolution than point out at present any special means of carrying them out. He thought those would follow as soon as they convinced the public that such exhibitions were necessary to the proper education of the working classes. He believed the best schooling they could have was that of the eye. They taught the working man better by letting him see what others had done. Therefore, if in any town celebrated for a particular manufacture, exhibitions were held triennially or quinquennially, great good would be done. All he thought they could do at present was to shadow forth and send it round to the Institutions that they thought this a useful means of education, and that every assistance that the Society could give would be given, as a great means of promoting the intelligence of the middle classes.

The Chairman suggested that the word "competitive" might be struck out of the resolution.

The Rev. J. Alton Hatchard inquired whether these exhibitions would be thrown open to foreigners? There were many branches of handicraft in which foreigners excelled the artisans of this country, particularly in carving, in which we were, in his opinion, extremely deficient. If they could bring their own artisans into competition with foreign artisans, it might be found useful to them and to the public generally.

Mr. Chester said the resolution left it open to make the exhibition international.

The Rev. J. Alton Hatchard suggested that the idea should be made known in Paris and in the provinces of France.

The Chairman said the view taken by the last speaker had not been forgotten in the communication that had been addressed to the Painters' Company. It was suggested that foreign and native operatives might send in specimens on the same terms. If he might express his own feelings on this subject, he would say he endorsed all that had been said as to the importance of skilled workmen having an opportunity of exhibiting their productions. It had been some disappointment that the examinations they had established had not taken sufficient hold of the practical mind, but in the cases in which they looked for an acquaintance with the principles which governed a particular operation they had been disappointed in the results.

The resolution was then put, and carried unanimously, with the omission of the word "competitive."

The Chairman then brought forward the next subject on the Programme:—

The Conference will be asked to consider whether arrangements should be made to enable Excursion Parties of Institutions in Union with the Society of Arts to assemble in a great gathering at the Crystal Palace, on Monday the 26th, or Tuesday the 27th of August, or on some other day.

Mr. Chester said, as this was his own child, he would father a resolution in reference to it. The Institutions in the country were in the habit of making annual excursions, and it was thought that they might enjoy an aggregate gathering at the Crystal Palace on one of the days mentioned. Although for the first year or two the numbers who attended might be moderate, he had no doubt in course of time large numbers would be brought together at these annual gatherings. The Council had had some communication with the managers of the Crystal Palace, who had expressed themselves most anxious to meet the views which had been laid before them. He had suggested the 26th or 27th of August as days most convenient to the Institutions, being about the time when excursion parties usually took place. If the Conference was favourable to this proposition it might be desirable to form a small committee for the purpose of carrying out the arrangements, and he was quite sure the managers of the Crystal Palace would be ready to meet them. It had been suggested that the Society should make arrangements for the transit of the excursionists, but he did not think it possible they could undertake that duty. He thought it should be left to each Institution to make its own terms with the railway companies, and the Council might go to the extent of writing to the different railway companies, informing them that such an intention existed, and requesting them to promote the arrangement as far as possible. He would move :—

"That it is desirable that arrangements should be made to enable excursion parties of the Institutions in Union to have a great gathering in the Crystal Palace on whichever of the two days mentioned may be most convenient."

Mr. Barnett Blake said he had prepared the following resolution :—

"That it is advisable to have a great gathering of the members of Mechanics' and other Institutions and their friends at the Crystal Palace on Tuesday, the 27th of August next, and that the Council of the Society of Arts be requested to assist in facilitating arrangements with the respective railway companies for excursion trains at low fares on the various lines of railway for three or four days."

He had named Tuesday as being most likely to prevent the desecration of the Sabbath day by travelling on that day. If the gathering took place on the Monday, people would travel on the Sunday. He thought there was no reason why the Council should repudiate the responsibility of making the arrangements with the railway companies. It would be quite sufficient for them to communicate to the managers that such a project had been started, and request them to state the terms on which they would convey the parties to and fro. In the case of a large gathering of the Yorkshire Union at Scarborough, there was no difficulty in making satisfactory terms with the North Eastern Company. He believed the railway companies would promote such an object, and if they could have trains from Liverpool, Hull, and other places, at 10s. a head, he had no doubt they might have a great gathering.

Mr. Wm. Hawes remarked that the difference between the two propositions was this—in the one they had a resolution of a general character, whilst the other was more detailed in its nature. It was always agreeable to hear the sentiments of an enthusiastic advocate of a cause. Looking at what was to be the result to be attained by this gathering, he believed it would give great pleasure to a vast number of people. Looking at the large numbers from the country who visited the first exhibition in 1851, he thought they might calculate upon a much larger influx to the approaching Exhibition of 1862, which was calculated to do more good in its way than the former one, and this proposed gathering would be a preliminary step towards the arrangements for the visits of people from the country to the next exhibition. He begged to second Mr. Blake's resolution.

Rev. J. Alton Hatchard would support both resolutions if it were necessary, upon the principle of affording the people a holiday. He would encourage holidays amongst the masses as much as possible. He agreed with the spirit of both resolutions.

Mr. Chester said it was suggested that the Council should make a general communication to the managers of the railways asking them to give facilities for the excursion, but he did not see how they could enter into any special arrangements.

Mr. Rumney (Manchester Mechanics' Institution) said one great point was to obtain lodging for the excursionists. There would probably be 3,000 or 4,000 from Manchester, and the great difficulty was where they were to go to on returning to London at night from the Crystal Palace.

Mr. Redgrave said the scheme of providing lodgings for visitors was found wholly impracticable on the occasion of the Exhibition of 1851. It was found that the majority of the visitors had friends living in some part of the metropolis.

Mr. Akroyd remarked that they could get no information on the essential point of the railway fares until the number of excursionists from each district was known. He thought the local bodies could make better arrangements for themselves than any Central Committee could do for them. In the case of the Yorkshire Union there would be no difficulty in the matter. As President of the Yorkshire Choral Union, he could state that they had no difficulty in making satisfactory arrangements for a cheap excursion to London, and those arrangements were effected entirely by local parties.

Mr. Poppleton said, railway companies sometimes conceived a special dislike to particular towns. In 1851, parties were brought from Guildford for 1s., whilst parties coming from Farnham were charged 2s. 6d. He thought an appeal from the Society on this subject would have great weight.

Mr. Chester said it was proposed that the Council should make a general communication to the railway companies.

Mr. F. Talbot seconded Mr. Chester's resolution. The members of his Institution had taken excursion trips for several years on the North-Western and Great Western lines, and they made them the means of adding 100 or 150 volumes of books to their library on each occasion from an allowance of 10 per cent. from the gross receipts of the railway company. He suggested whether other Institutions could not benefit themselves in the same way.

After a further conversation Mr. Chester withdrew his resolution, and the motion of Mr. Barnett Blake was unanimously adopted.

The Chairman then brought before the meeting:—

The Adjourned question, whether the Institutions can advantageously make arrangements for their members to visit the International Exhibition of 1862.

Mr. Mercier said at Salford they had already commenced arrangements for visiting the Exhibition of 1862 by forming a fund for that purpose. Members of the College who were desirous of coming to London on that occasion were subscribing weekly towards that fund. He believed the College intended to make their own arrangements with the railway company.

The Secretary introduced to the notice of the Conference the rules which had been issued on this subject by the Basingstoke Mechanics' Institute, which he said contained some useful suggestions, and which would be printed in the *Journal.*

Mr. T. J. Pearsall recollected that in 1851 there were great complaints of irregularity in the times of returning of the excursion trains into the country. He thought the moral effect of the interference of the Society of Arts would be to insure greater punctuality in that respect. Parties had been sometimes kept waiting nearly the whole day at the station, and arrived at their destination at unseasonable hours of the night.

Mr. J. Marshall Carpenter believed any arrangement of this kind would be gladly accepted by all the Institutions. The metropolitan institutions would be peculiarly situated, as being residents they would not require any advantages of railway arrangements.

The Chairman said he felt sure that the Council would gladly take upon themselves the duty of representing the wishes of the Institutions to the Commissioners for the Exhibition. Some present were doubtless aware, that in a paper recently read before the Society, by Mr. Hawes, a strong desire was expressed that the Commissioners should admit the working-classes to the Exhibition at as low rates as might be practicable, and he had no doubt the Commissioners would be inclined to look favourably upon the suggestion, from a feeling that no more important end could result from the Exhibition than the intelligent instruction of the working-classes of the country.

Mr. John Hixon (Holmfirth Mechanics' Institute) had advocated this proposition at the last Conference, and he thought the visit to the approaching Exhibition of 1862 would be more important than that of 1851.

Mr. Chester said the former resolution having been passed by the previous Conference, the Council might very properly be requested to convey to Her Majesty's Commissioners the strong desire of the Conference that they would provide for the admission of the working classes on the lowest possible scale.

The following resolution having been proposed and seconded, was put to the meeting, and passed unanimously:—

"That the Council of the Society of Arts be requested to express to Her Majesty's Commissioners for the Exhibition of 1862, the earnest desire of this Conference that arrangements be made for admitting the members of Mechanics' and similar Institutions and the Working Classes generally to that Exhibition at certain periods at an extremely moderate rate."

The Chairman said the next subject for consideration was as follows:—

The subject of Mr. Buckmaster's Motion (of 1859), respecting the exclusion of Institutions from the Parliamentary Grants for Education, adjourned from the former Conference.

Mr. J. C. Buckmaster said it was not his wish to renew this discussion, but he did so at the expressed desire of the last Conference, when it was understood that the subject should be again brought under consideration with reference to the resolution which he moved in 1859. The resolution he then moved was, "That the aid now given by the Committee of Council on Education should be extended to Evening Classes held in connection with Mechanics' Institutions." The case was one which would be easily understood by the Conference, and he was desirous of obtaining from them some definite expression of opinion on this subject, because it was one which had excited a great deal of interest in different parts of the country, and a sense of injustice appeared to exist with reference to the distribution of the grants for education. The Privy

Council made some small grants to evening schools held in connection with inspected day schools, but this was refused to evening classes in connection with Mechanics' Institutions, although the course of instruction pursued in each was the same. The boy in the former case had the advantage of a certificated and competent master, but if the same boy was taught in the class-room of the Mechanics' Institution, he had not the same opportunities of instruction. What he said was this, that the principle upon which the grant was made was either right or wrong. If the principle was admitted to be good in itself, he was at a loss to understand why it should not be extended to teaching of the same character in Mechanics' Institutions? The subject was of importance, because the Society, ever since it took the Institutions into Union, had made a prominent point of evening adult education, and he believed the extension of the Government aid, in this form, to Mechanics' Institutions would give an impulse to the educational operation of a large number of Institutions. He knew something of the feelings of the working classes on this subject, and he was aware that their sympathies and inclinations were in favour of evening classes in connection with Mechanics' Institutes. He thought the Conference ought not to shrink from expressing an opinion on this subject, either from the difficulties which surrounded it, or, that it could be better discussed at a future time; and he thought the expression of a favourable opinion would facilitate the extension of that aid for which he contended. He begged to move—

"That in the opinion of this Conference, the aid given by the Committee of Council on Education should be extended to evening classes in connection with Mechanics' Institutions."

Mr J. H. Beale (Banbury Mechanics' Institution) said, in some of the smaller towns where they had a Local Board there was great difficulty in finding teachers to conduct the classes. In such cases they required the aid which Mr. Buckmaster proposed. He could say in his own town of Banbury they had always experienced a difficulty in obtaining funds to provide competent teachers, as the whole funds of the Institution were absorbed for other purposes, and if educational apparatus were required, they had no means of furnishing it. He thought it was the duty of the Committee of Council on Education to afford as much assistance as possible to every Educational Institution in the country, and he thought the form in which it was now proposed would very much assist the efforts of the Mechanics' Institutions. He had much pleasure in seconding the resolution.

Mr. Redgrave said it was to be considered whether this aid did not involve inspection, and he was sure that would not be agreeable to Mechanics' Institutions. He believed no government grant of any kind was made without inspection. They ought maturely to consider the question before they passed a resolution involving government inspection.

Mr. Montgomerie said it would not be compulsory upon Institutions to accept the aid. Those who chose could refuse it.

Mr. Rumney called upon the Conference to pause before they passed the resolution, especially when they found that such aid involved inspection. The Institutions had been self-supporting, and they were at the present time in a more prosperous condition than they had ever been before. For the Institutions in Lancashire he could say, with all their struggles—and their adversities had not been without benefit—they had never been in a more prosperous condition than they were at the present time. The aid sought was, that out of the taxes of the people these young men in the country should be instructed. He was sure the people of Lancashire would repudiate such a grant. As day schools progressed, there would be less difficulty with regard to maintaining the evening classes of Institutions generally, inasmuch as there would be an increased desire on the part of the youths to complete the education they had received in the day schools. Hitherto the difficulty had been a want of inclination, and no capitation grant would stimulate that. If they accepted this grant, they took away the independence of the middle classes who were the promoters and supporters of the Institutions; and he believed from the moment they received aid from the public taxes they might date their downfall. He was sure the Institutions of Lancashire would put up with anything rather than accept the proposed aid.

Mr. J. Marshall Carpenter remarked that one of the conditions on which the Committee of Council granted aid was, that there should be inspection by Her Majesty's Inspectors.

Mr. Barrow Rule thought the granting of this aid would tend to the injury of the institutions. It was true that those only need accept it who chose, but he was afraid if the Government offered it, very few would have courage to resist the bribe; but if they accepted the bribe they must be content to submit to inspection and the regulations that would be imposed as to the description of room, ventilation, desks, &c.; and instead of every Institution having free course to manage its own affairs, there would, in his opinion, be introduced a system of centralization, which would greatly obstruct the progress and advancement of the Institutions.

Mr. Barnett Blake remarked that one of the conditions of the grant would be that the Scriptures should be read in the Schools.

Mr. J. S. Noldwritt (Walworth Literary and Scientific Institution) said it appeared that some of these evening classes had not sufficient funds, and he apprehended this proposition was only intended to apply to Institutions in that position. As to inspection, that really was a strong reason in favour of the motion, for if they had not a proper room, properly ventilated, it was very desirable that such conditions should be enforced. This proposition was quite of a permissive character, and it was at the option of Institutions to refuse the aid. He was acquainted with schools in the neighbourhood of London which got on very well with such aid.

Mr. Francis (Beaumont Philosophical Institution) expressed his opinion that the education of the poor was of an improved character, and they had a much better class of teachers than formerly; and if the managers of institutions thought they could get a better class of teachers by accepting the aid, he thought they ought to take it.

Mr. Harvey (Notting-hill Working Men's Association) deprecated the appropriation of a farthing of the public money to this purpose, as it would utterly destroy the principle on which these valuable institutions had hitherto rested. For seven years he had laboured hard for the support of an institution which had existed for that period; but he was quite sure, if there had been an idea that it would accept Government assistance, he should not have obtained a sixpence of subscriptions. The voluntary system he considered was the glory of the institutions, and he hoped the Conference would negative the resolution.

Mr. Akroyd did not object to grants by the Committee of Council on Education, for he was himself connected with a school subject to inspection by government. That was a Working Man's College, which derived great advantage from being connected with the day schools and being subject to inspection. But this resolution involved a difficulty, which was this; the grant for education he believed had almost arrived at the maximum, which the House of Commons was disinclined to exceed. He did not think any such proposition would be favourably received by the Committee of Council on Education. Although, as a matter of principle, he did not object to it, yet on economic grounds he thought the time was not favourable for such an application. He would, therefore, suggest that the consideration of the subject be postponed.

Mr. C. J. Womersley (Pres. of the Hastings Mechanics' Institute) said there would be insuperable difficulty in the working of a resolution of this kind. He had, moreover, a strong objection to the principle of running on all occasions to government for support.

Rev. J. Alton Hatchard said, the difficulties in his In-

stitution had not arisen from poverty of funds; they had had plenty of pecuniary aid. The principal difficulty they had experienced was in getting competent teachers. He thought government grants were carried too far at present. There were wealthy places in this country receiving grants which they ought to be ashamed to receive. All these grants ought to be concentrated upon poor places. He should give a decided vote against receiving a farthing of patronage from the government for Mechanics' Institutes, which he considered at the present time in a very flourishing state.

Mr. T. J. Pearsall thought it might be left open to such Institutions as required it to receive the Government aid, and he hoped the Inspectors would be able to give a good account of what was done with the money. He thought Mechanics' Institutions would derive benefit from a little wholesome inspection. In many Institutions scientific education could not be carried on because they had not the means of supplying the necessary educational apparatus. He did not entertain the horror against Government grants in aid which some gentlemen had expressed. He had no fear of the Government Inspectors tampering with the feelings of those connected with the Institutions. He should like to see grants in aid extended to those Institutiors which required them for the purpose of establishing scientific classes, and he thought the resolution ought to be supported as an experiment.

Mr. Chester said it was impossible to exaggerate the importance of this subject. He was not one of those who thought that under no circumstances ought Government to interfere with education, but he thought they ought not to allow Government to interfere without a necessity, and the indication of that necessity should be of the strongest kind before they allowed the Government to put a finger upon it. It was probably necessary in 1839, that the Government should interfere as it did, and it might be said upon the whole to be attended with happy results. But of late years it had come to be considered as if it should pass into a permanent system—that Government was to have the education of the people entirely under its control. That, certainly, was not the intention of the original founders of the Committee of Council on Education, but it was stated by Earl Granville, Lord John Russell, and others, that it was to prepare the way for something which the people themselves should manage. It was the proper function of Government to set the thing going, but not to interfere more than was necessary. He could not vote for the motion of Mr. Buckmaster, because, although he did not intend it, yet he proposed interference in a way most likely to damage the independence and prosperity of the Institutions generally; for, in reality, what he proposed was, that the Institutions should be brought under the inspection of the Government. Mr. Blake had asked whether it was not a condition that the Scriptures should be read daily. It was not necessary to read them in the evening schools or classes, but it was necessary that the Bible should be read daily in the building, and in the same room which was afterwards to be occupied by the adult evening class. One gentleman had said he was not afraid of a little wholesome inspection. Such a thing as a little inspection did not exist. It was like planting a seed which grew to a large tree, and where inspection had existed for a number of years it grew into a system of guidance and control. The Inspector was the real governor of the school, and unless they were prepared to make him the governor of the Institutions, they must not submit to government inspection. If government assistance was to be given at all it should be upon the results of instruction. In the East Lancashire Union of Schools, under Sir James Kay Shuttleworth, that plan was adopted, and if any aid was to be given, he should prefer its being given in that form rather than in the way now proposed. He was one of those who thought it very necessary to give a check to the desire which was apparently felt in many places that the interference of Government in matters of education should be extended. It was not the desire of the Government themselves, but it had been forced upon them to a much greater extent than the heads of the Government ever contemplated. It was quite useless to pass such a resolution as this at the present time, because the Chancellor of the Exchequer had shown a desire to check the rate of expenditure, and the Committee of Council would not be prepared to give effect to such a resolution.

Mr. Mayer, from the little experience he had had in matters of education, thought it desirable that some aid should be given to evening classes of Mechanics' Institutions. He believed a minute of Council existed by which assistance might be given to Mechanics' Institutes to the extent of providing educational apparatus, &c. The extreme advocates of the voluntary and independent system appeared to come from Lancashire. They were told that the Institutions there were kept up in a state of prosperity by the subscriptions of the members, but it should have been added that the prosperity of many Institutions had been greatly promoted by the contributions of the wealthy of the neighbourhood. He thought it desirable that some representation on this subject should be placed before the Committee of Council.

Mr. Buckmaster replied to the objections taken to the resolution; after which the Chairman put the motion to the meeting, when it was negatived.

List of Lecturers.

The Chairman asked the representatives whether they desired that the Society should print and issue to the Institutions another edition of the list of lecturers, when a general opinion was expressed in favour of the Society taking this course.

Mr. Barnett Blake said he would follow that up by moving—

"That the Council of the Society of Arts be requested to publish a list of subjects suitable for discussion, and also brief rules and suggestions for the management of an essay and discussion class, and to forward the same to every Institution in Union."

This having been seconded, was, after a brief conversation, unanimously agreed to.

Mr. Barnett Blake further moved:—

"That the several Unions of Educational Institutes be requested to send a copy of the scheme for Elementary Examinations, when the same shall be settled, to each of the Institutions in Union with them, and that the Council of the Society of Arts be requested to send copies to each of the Local Boards of Examination in connection with the Society, and to such other Institutions as are not yet in Union with the Society."

The resolution having been seconded by Mr. Chester, was put to the meeting, and carried unanimously.

The Rev. J. Alton Hatchard gave notice that, at the next Conference, he would move the following resolution on the subject of national holidays:—

"That, in the opinion of this Conference, it is desirable to have one or two National Holidays during the Summer season, and that the Council of the Society of Arts be requested to ascertain the opinions and feelings on this subject entertained by the members of Mechanics' Institutions and others."

Mr. Hatchard remarked that at present they had only the following national holidays: Good Friday, Christmas Day, and the Sabbath. These were all religious holidays, and they knew too well how these were kept by the working classes.

Mr. C. J. Womersley moved a cordial vote of thanks to the Society of Arts for the valuable help afforded to the Institutions in Union, and to Sir Thomas Phillips their Chairman that day for the ability, impartiality, and patience with which he had presided over the business of the Conference.

Mr. Mercier seconded the resolution, which was unanimously adopted.

Mr. J. S. Noldwritt wished to introduce a subject to the notice of the Council. The Institution which he re-

presented having on several occasions appropriated their lecture hall to purposes of musical entertainments, they had been served with notice by the proprietors of neighbouring public gardens that if they were continued, proceedings would be taken under the Act 25 George III., to recover the penalty of £100 for holding musical entertainments in an unlicensed building. He should be glad to be informed whether the Institutions were legally liable to such proceedings.

The Chairman said he could not answer the question at the moment, but he might state that the attention of the Council had been called to the state of the law with regard to places of public amusement, and as to how far it affected the proceedings of Institutions, and a committee had been formed for considering that subject which was at present receiving communications on the question. He could only express to the Conference the satisfaction it was to the Council of the Society of Arts to be permitted to co-operate with them in endeavouring to extend the education of the working classes in the country. It was a great work which he was sure they had all equally at heart, and whenever they could indicate any field in which this work could be usefully extended, it would be a great gratification to the Council to assist as far as lay in their power. On his own behalf, he begged to thank them for their kind expression of feeling towards himself.

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS.

(*Continued from page* 550.)

Produce of Morocco. — The chief produce of the provinces near Mogadore are—of Shidma, Indian-corn, wool, goat-skins, and gum; of Haha, barley, almonds, gum-sandrac, and goat-skins. Argan oil also is abundant in both provinces. Olive oil (in a smaller degree), almonds, oil, wool, and seeds, also gum, are brought in great quantities from Morocco, but the richest part of the country is undoubtedly Sous, from Agadeer southward and inland. Thousands of camel-loads of almonds and olive oil, gums and skins, are continually on the route from that province to Mogadore; the almonds are produced in the higher lands, where other vegetation is difficult, or cultivation impossible.

Tangier.— The oranges and lemons of Tangier, of which large quantities are annually exported to Europe, are equal in quality, if not superior, to those grown at Seville. This neighbourhood is also famous for its vines, a reputation which it appears to have enjoyed in ancient times, when the country around Cape Spartal was called "Ampelusium." From grapes produced here, excellent wine, resembling the Vin de Grave, has been made by private individuals. The soil and climate of this province are well adapted to the cultivation of olives, cotton, rice, the sugar-cane, and tobacco; and, as the mulberry-tree thrives luxuriantly here, the culture of silk might be successfully established.

Morocco Cattle.—The race of horses, for which Morocco was once so famous, has, of late years, been allowed to degenerate considerably, in consequence of the discouraging fact, that whenever a farmer succeeds in rearing a fine colt or filly, it is nearly sure to be forcibly taken away from him by the Governor of the district he resides in, or by some other officer of the Sultan. The cobs, galloways, and ponies of the present day, are, nevertheless, hardy, symmetrical, and pleasant to ride. They stand, generally, from 14 to 14¾ hands in height. The horned cattle, though small, are numerous and of good breed. The broad-tailed sheep of the country are also a source of considerable profit to the graziers, each fleece of wool being worth nearly half as much as the whole value of the animal from which it is shorn. The goats are chiefly valuable for their skins, which furnish a large proportion of the justly-celebrated Morocco leather. An arbitrary and unjust impost—the confiscation by the Sultan of the skins of all animals slaughtered in the country—has had the effect of causing the number of goats gradually to decrease of late years. The camels, mules, and asses, invaluable in this country as beasts of burden, are easily nourished, and capable of a considerable amount of labour. There are, probably, in the province about 15,000 horses, 4,000 camels, 3,000 mules, and 2,000 asses.

Leeches. — At Tangier, bark and leeches are objects of monopoly. The leech monopoly, in 1856, was sold for about £14,000. The number of leeches annually exported is from fifteen to eighteen millions. Spain and France receive the greater part of them.

Tetuan.—About four or five miles from Tetuan there have been discovered rich veins of copper ore, which a French company attempted to work, but from having no capital or proper overseers, the speculation failed. Specimens of antimony, manganese, and lead have also been found in the mountainous districts to the north-west of Tetuan.

Newfoundland.—Manure, which may now be considered as an article of Newfoundland trade, is manufactured on Massacre Island, at St. Pierre's, in the following manner:—Old herring bait, at a cost of two francs per barrel, is salted with foreign salt, then boiled in a furnace, containing 250 gallons, for three hours; when cold, put into thick round mats, made for the purpose, about two feet in diameter, then placed under a screw, about twelve of them at a time, for twenty hours, by which process the water and oil are pressed out; these run, by means of a shallow trough and conducting spouts, to casks outside the building, after which the oil floats, and is taken off, yielding about five per cent.; the mats containing the herring are put out, after pressing, to dry for two days: it is then taken from the mats, put into flour barrels, and closely packed by treading upon it; some is put into boxes, containing 224 lbs. each; the barrel contains about the same weight. Caplin are made into manure as above, but do not produce oil. Cods' heads, also, in the same manner. Cods' heads are also well dried on a beach, for five days or a week, without any salt. They are then packed into flour barrels, screwed in and sent to France, where they are ground up for manure. All these manures are said to be better than guano, and fifty per cent. higher in price. Mussels, oysters, bones, kelp—I saw specimens of all these manures, ground to a powder, said to be equally as good as any other kinds. In the manufactory, which is about sixty feet long by forty wide, I saw thirty screws fixed in frames, over troughs, say five in each frame. Forty men were here employed last year, but now less, on account of some having been lost coming out the last spring; the establishment could manufacture twenty tons per day with more room. Three hundred tons are sent to France; the island is not large enough to carry it on to the extent desired. There are no mills at present for grinding, but it is intended to import some next year, and fully complete the manufacture at St. Pierre's. If these manures pay and answer at so great a distance as France, why should they not answer the inland agriculture of Newfoundland?

Paraguay Products.—There are many natural products in the country which have hitherto been little attended to, but which might become important articles of commerce—such as indigo, cochineal, caoutchouc, hemp, gums, wax, and medicinal and dye-plants.

The Province of Pangasinan (Philippine Islands).—Pangasinan produces:—

Rice to the extent of from 600,000 to 700,000 cavans annually, as far as I have been able to judge, for exportation alone.

Sugar, which averages, one year with another, from 100,000 to 150,000 pilones or pots of more than 75 lbs. each.

Indigo, of which were gathered from 150 to 200 quintals

from the last crop, although it seems susceptible of more extensive cultivation, and on a demand a much larger quantity could be obtained.

Gum-Mastic, Sapanwood, Timber for building purposes, and other articles of minor importance.

MINERALS IN SIAM.—Mr. H. J. Moyle, of Bake, in Cornwall, who has been travelling in South Africa, was attracted to Siam by its novelty and the facility of exploration disclosed by the recent treaty. Having made his way to Nophburi, about sixty miles, in a direct line from Bangkok, he found the country so rich in copper and iron ores (of the former of which the natives made no use, being ignorant of their commercial value) that he returned to Bangkok, and obtained, under a deed from the Siamese Government, permission to work the lodes of that district, on payment of a royalty of ten per cent. of the ores extracted. It must, however, be remembered that the Siamese Government is under no treaty obligation to permit foreigners to work the mines of Siam.

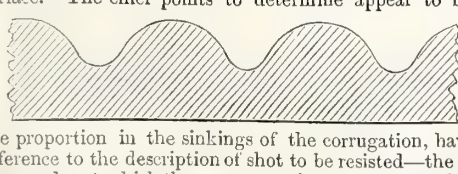
Memorandum of Mr. Moyle.—The country along the banks of the River Chan Phya (Meinam), as far as Nophburi and its environs, lat. 15 deg. 25 min., is covered with alluvial deposits, or a mixture of these and diluvium. The hilly and mountainous districts, extending north and south in this latitude, and running many hundreds of miles in both directions, contain many valuable and rich mineral productions, though the natives do not avail themselves of them by working mines. In these hills I detected several rich and valuable veins of copper ore, principally in grauwacke; I considered them of so much value and importance, that I applied for and obtained permission from the Siamese Government to work them for five years, on payment of a royalty of one-tenth of the ores to the Crown of Siam. Lead and silver ores I also discovered, as well as enormous beds of magnetic iron ore and specular iron ore. The country to the north is carboniferous limestone, with positive indications of the existence of coal. The rivers, creeks, and canals, with which this country abounds, extending in many places to the base of the hills, afford great facilities for transport, &c. I am impressed with the opinion that, should a fair portion of encouragement be given, the country of Siam will rival, if not surpass, any country of the East in the richness of its mineral productions.

Home Correspondence.

ARMOUR-PLATES FOR WAR VESSELS.

SIR,—I would suggest, for the consideration of your many scientific readers, whether equal resistance may not be obtained, with considerable reduction of weight, by some modification of the flat surface of the 4-inch iron plates now used for the armour of our vessels of war. The question is of great importance, and one, perhaps, to which science, without direct experiment, may not be prepared to give a satisfactory reply.

I enclose the section of a corrugated plate, which would save about one-fifth the weight as compared with a flat surface. The chief points to determine appear to be—



the proportion in the sinkings of the corrugation, having reference to the description of shot to be resisted—the surface angles at which the greatest resistance would be found to flat-headed bolt shot—and, generally, the distribution of the metal, by means of corrugation, to ensure the greatest strength. I am, &c.,

S. R.

Kensington, 12th June, 1861.

Proceedings of Institutions.

NEWINGTON WORKING MEN'S ASSOCIATION. — The seventh annual report gives a satisfactory account of the proceedings of the past year. One great reason of the success hitherto enjoyed is thought to be that the Committee have not aimed at too much, but have rather striven to make the Society a true Mutual Friendly Association, wherein each member is expected to contribute to the general weal, and to put forth a helping hand, whenever he can do aught, however slight, to promote its benefit. 435 have been enrolled as members during 1860, though the average number regularly on the books is of course very much less. The attendance at the reading-room has been 12,191, and the loans of books, 2,144. The classes have been all well attended, and it may be said, that quite three-fourths of the members are to be found attending one or another, and the Committee desire to return their warmest thanks to the class teachers for their willing, zealous, and able discharge of their duties, which has so materially tended to the prosperity of the Association. There are classes for English grammar, arithmetic, writing, fencing, drill, music, and singing. The library has received but few additions during 1860, and there is great need for an increase to its numbers, (about 700 vols) as many works have by usage become almost "shreds and tatters," resisting even the binder's restoring powers. To enable them to replace these, and to add fresh volumes, the Committee trust they may be allowed to appeal to their friends and supporters, pointing to the results of their labours as a clear proof that the Association is appreciated, and that in this densely populated neighbourhood, it is "the right thing in the right place." The lectures generally have been well attended, and the best thanks of the Committee are tendered to those gentlemen who have so ably illustrated the subjects which they have from time to time brought before the members,. The subjects were, "The Fairy Legends of Ireland." "Hamlet and Macbeth contrasted." "Pens, Ink, and Paper." "Eliza Cook's Poems." "The Poetry of Charles Mackay." "The Testimony of the Rocks, and the writings of Hugh Miller." "The Army." "Milton's Paradise Lost." "Our Coal Fields." "Flies and Spiders." "Heroism." "Flowers—how they work." "Macbeth," (A Dramatic Reading); and Garibaldi." The lecturers were respectively, Revs. J. Going, J. Jessop, and W. S. Simpson; Messrs. Fearn (2 lectures), Rickman, Carter, Coombe, Bunyard, Selway, Goddard, Johnson, Yarrow, and Doulton. In addition, a *soirée* was held for the exhibition of articles of interest, photographs, &c., at which a paper was read by Mr. H. Syer Cuming, on "Sir William Walworth." A Musical Entertainment was also given at the Horns', by Mr. Thomas Rogers, entitled "Modern English Composers." Financially the report is very satisfactory: not one debt of the year 1860 remains unpaid, except a small sum (£1 9s.), due to the sub-treasurer. In conclusion, the committee impress on the working classes, that this Association to be successful must be supported by them, not alone as joining as members, but by the taking a lively interest in its working, and hand-in-hand endeavouring to further its objects.

MEETINGS FOR THE ENSUING WEEK.

MON. ...Brit. Architects, 8.
TUES. ...Medical and Chirurg., 8½.
Zoological, 9.
WED. ...Society of Arts, 4. Annual General Meeting.
Royal Soc. Literature, 4½.
THURS....Royal Soc. Club, 6. Anniversary.
Philological, 8.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, June 14th*, 1861.]

Dated 19th February, 1861.

409. W. Pidding, Borough-road, Southwark—Imp. in envelopes and letters and in the mode of securing them, also in the seals or seal impressions, or wafers used for such purpose.

Dated 30th May, 1861.

1347. W. P. Savage, Roxham, Downham, Norfolk—Imp. in reaping and mowing machines.
1348. F. A. Whitehead, 7, Whitehead's-grove, Chelsea—Imp. in treating cream or milk, and in obtaining butter and other products therefrom.
1349. C. Garrood, Penge, Surrey—Imp. in horse rakes and harrows.
1350. J. H. Johnson, 47, Lincoln's-inn fields—Imp. in apparatus for regulating the pressure of gas. (A com.)
1351. T. Y. Hall, Newcastle-upon-Tyne, and J. Stockley—Imp. in apparatus for communicating signals, applicable to railway trains and vehicles on land, and to vessels on water.
1352. J. Ronald, Liverpool—Imp. in machinery for the manufacture of "topped up," "formed," or "laid" thread, twine, cord, line, cable, or other cordage.
1353. A. Blake, 17, Russell-place, Fitzroy-square—Imp. in the process of brewing.
1355. L. Heinemann, Cannon-street West—An improved fastening for purses, reticules, bags, belts, bands, pocket books, cigar, writing, and instrument cases, and other similar purposes. (A com.)

Dated 31st May, 1861.

1356. W. Bywater, Leeds—Imp. in means or apparatus for finishing and drying thread, twine, cords, and ropes.
1357. M. Henry, 84, Fleet street—Imp. in the manufacture of shirt fronts, and in producing fabrics and materials for the same. (A com.)
1358. W. Hunter, Glassford-street, Glasgow—Imp. in looms for weaving.
1359. H. B. Mackay, Knockmore House, Ballymoney, Antrim—Cleaning flax, separating the fibre from the straw, called a flax scutching machine.
1360. W. E. Gedge, 11, Wellington-street, Strand—Improved machinery or apparatus for cutting stone of every description. (A com.)
1361. R. A. Brooman, 166, Fleet street—An improved apparatus to be applied to the shoes of horses and other shod animals to prevent them from slipping in frosty weather. (A com.)
1362. F. Tolhausen, 35, Boulevart Bonne-Nouvelle, Paris—Imp. in revolving fire-arms. (A com.)
1363. E. C. Healy, 163, Strand—Imp. in ordnance and fire-arms. (Partly a com.)
1364. E. Hartnall, Ryde, Isle of Wight—An imp. in the manufacture of paper.
1365. G. Glover, 8, Queen-square, Westminster—Imp. in gas meters and pneumatometers.
1366. P. Cameron, Glasgow—Imp. in instruments for measuring, indicating, and regulating the pressure and flow of fluids.

Dated 1st June, 1861.

1369. M. Wigzell, Friars-green, Exeter—An imp. in the form of iron, steel, brass, copper, and other metallic alloy for making nails, spikes, bolts, screws, and other similar driving articles, both plain and twisted.
1370. M. Burke, Liverpool—Imp. in the manufacture of folding metallic chairs, bedsteads, and sofas, and other articles for sitting, lying, or reclining upon, a part of which improvements may also be applied to other articles of metallic furniture.
1371. T. Coradine, Glasgow—Imp. in machinery or apparatus for cutting or dividing metal or other sheets or plates.
1372. R. Wilson, Liverpool—Imp. in anchors.
1373. G. Watson, Commercial-road—Imp. in disengaging apparatuses for boats.
1374. J. Taylor, Oldham, and R. King—Imp. in machinery or apparatus for preparing cotton or other fibrous materials to be spun.
1375. P. Gondolo, 29, Boulevart St. Martin, Paris—An improved kneading machine.
1377. H. Stansfield, 41, Back Drake-street, Rochdale—Imp. in punching machines.
1379. R. C. Ransome, Ipswich—Imp. in reaping and mowing machines. (A com.)
1380. W. A. Shepard, Pall-mall, Middlesex—Imp. in steam boilers.
1381. C. Garrood, Penge, Surrey—Imp. in cultivators and horse hoes.
1382. W. A. Shepard, Pall mall, Middlesex—Imp in obtaining products from coal, and in apparatus employed therein.

Dated 3rd June, 1861.

1384. W. Harwood, Stow Market, Suffolk—Imp. in reaping and mowing machines.
1385. H. Allman, 13, Bedford-row, Middlesex—Certain imp. in the construction of castors for furniture.
1386. H. N. Penrice, Witton House, near Norwich—Imp. in machinery for tunnelling and driving galleries through rock and other strata.
1387. W. R. Jeune, Flower-terrace, Campbell-road, Bow, Middlesex—Imp. in the manufacture of kamptulican.
1388. G. B. V. Arbuckle, Charlton, Kent—Imp. in armour coating for ships, fortifications, and other structures.
1389. J. Towl, Plumstead, Kent—Imp. in propelling vessels.
1390. J. D. Davidge, 3, City-terrace. Old-street-road—Imp. in the construction of arches or other curved structures made of brick, stone, or other material.
1391. O. Muck, 4, South-street, Finsbury—Imp. in machinery or apparatus for the manufacture of matches. (A com.)

Dated 4th June, 1861.

1395. S. Hargreaves and R. Holden, Helmshore, Lancashire, and H. Holt, Newchurch—Imp. in machinery or apparatus for sizing warps or yarns.
1398. J. M. Stevenson, 5, Prospect-place, Cheyne-walk, Chelsea—Imp. in the manufacture of boots and shoes.
1399. D. W. Thomas, Liverpool—Imp. applicable to centrifugal machines. (A com.)
1400. W. R. Floyd, Commercial-road East—An improved means of or apparatus for supporting knapsacks and packs.
1401. J. Ford, Thames Iron Works, Blackwall—Imp. in ships' rudders.
1402. J. L. Hancock and F. L. Hancock, Pentonville—Imp. in implements for pulverising, ploughing, and grubbing land, and in applying motive power for working agricultural implements, parts of which imps. are applicable to condensing engines.
1403. J. H. Holdsworth, Wakefield—An imp. in preparing, "crabbing," or finishing piece goods, and improvements in machinery employed therein.
1404. A. Hubbell, Salisbury-street, Westminster—An improved apparatus to be used in washing clothes and other articles.
1405. A. Hubbell, Salisbury-street, Westminster—An imp. in churns.
1406. H. G. B. Roeber, Silvertown, Essex—An imp. in the manufacture of insulators for telegraphic wires, and in materials and machinery for coating telegraphic wires.
1407. S. Standfast, Hackney, Middlesex—An improved composition for building, to be substituted for brick and stone, and an improved method of constructing walls and roofs of houses and other purposes.
1408. J. A. V. Braam, New York—Imp. in constructing the barrels of fire-arms and ordnance, and in fire-arms.
1409. J. A. Williams, Baydon, Wiltshire—Imp. in machinery or implements for cultivating land by steam power.
1410. H. L. Buff, Osnabruck, Hanover—Imp. in the treatment of fatty or oily matters.
1411. E. C. Stanford, Worthing, Sussex—Imp. in obtaining products from sea weeds.

Dated 5th June, 1861.

1414. E. Smith, Hamburg—Imp. in wet gas meters.
1416. O. Chapman, Clerkenwell—An improved dressing and writing case.

PATENTS SEALED.

[*From Gazette, June 14th*, 1861.]

June 14th.
3091. A. S. Stocker.
3092. N. C. Szerelmey.
3101. T. W. Walker.
3104. C. Stevens.
3107. R. W. MacArthur.
3108. W. Scholes.
3109. R. A. Brooman.
3112. J. Chesterman.
3120. R. A. Brooman.
3146. E. Cook and J. Stokes.
3150. W. Clark.
3176. A. V. Newton.
3190. L. C. M. J. Vilcoq.
3193. B. N. de Buffon.
14. W. C. Fuller, J. A. Jaques, and J. A. Fanshawe.
124. E. Whittaker and J. Clare.
638. W. Clark.
884. J. Caw, jun.
908. J. R. Cooper.
916. W. T. Eley.

[*From Gazette, June 18th*, 1861.]

June 18th.
3116. R. J. Cole and M. S. Cole.
3117. O. Blake.
3121. R. A. Brooman.
3124. W. Mossman.
3130. F. Schwann.
3132. G. B. Rennie.
3137. H. Loveridge.
3138. J. Chatterton & W. Smith.
3139. T. Moore.
3148. G. Sandys.
3149. T. B. Marshall.
3151. A. Savage.
3158. J. L. Norton.
3159. J. L. Norton.
34. L. D. Owen.
68. W. Longmaid.
82. A. L. Le Mire Normandy.
253. J. H. Johnson.
254. B. B. Longridge.
542. W. E. Newton.
563. A. V. Newton.
639. J. Hunter.
673. J. H. Birkbeck.
885. W. R. Rogers.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, June 14th*, 1861.]

June 10th.
1333. G. T. Bousfield.
June 11th.
1338. W. Clark.
June 12th.
1341. J. H. Young.
1346. J. H. Johnson.
1351. G. Adshead.

[*From Gazette, June 18th*, 1861.]

June 11th.
1320. W. Davis.
June 13th.
1386. R. Winans and T. Winans.
1387. R. Winans and T. Winans.
1388. R. Winans and T. Winans.
1389. R. Winans and T. Winans.
1395. R. A. Brooman.
June 14th.
1348. C. C. J. Guffroy.
1357. J. Rubery and T. Warwick.
1359. G. T. Bousfield.
1491. J. L. Clark.
1528. J. D. Weston.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, June 18th*, 1861.]

June 14th.
1307. T. M. Fell.
1325. J. A. Williams.
June 15th.
1317. D. Lowe.

Journal of the Society of Arts.

FRIDAY, JUNE 28, 1861.

COUNCIL.

The Council, acting under Bye-Law No. 74, which empowers them "in each year to admit five persons eminent in Arts, Manufactures, or Commerce, or in the applications of abstract science to the same, as Life Members of the Society, without the ordinary formalities of election, and without payment of any subscription whatever," have unanimously elected the Right Honourable the Earl of Elgin and Kincardine, K.T., G.C.B., an Honorary Life Member of the Society.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £420,900, have been attached to the Deed.

Her Majesty's Commissioners have appointed the following Committees in addition to those already published in the *Journal*:—

Class 38 (Art Designs for Manufactures). The Marquis of Salisbury; Earl of Dudley; Sir J. P. Boileau, Bart.; D. Maclise, Esq., R.A.; C. D. Fortnum, Esq.; R. Monckton Milnes, Esq., M.P.; H. Cole, Esq., C.B.; Godfrey Sykes, Esq.; M. Digby Wyatt, Esq.; and J. H. Bowler, Esq.; G. F. Duncombe, Esq., *Secretary*.

Class 9 (Agricultural and Horticultural Machines and Implements). The Earl of Clancarty; the Earl of Erne; Lord Portman; Lord Talbot de Malahide; J. Easton, Esq.; Brandreth Gibbs, Esq.; John Gibson, Esq.; Chandos Wren Hoskyns, Esq.; Charles Lea, Esq.; J. Hale Maxwell, Esq., C.B.; James Stirling, Esq., C.E.; H. S. Thompson, Esq., M.P.; and Professor John Wilson, F.R.S.E.

Meetings of the Metropolitan Exhibitors have taken place, and Class Committees for the Metropolis have been appointed as follows:—

Class 6 (Carriages, not connected with Rail, &c.), Messrs. Black, G. Hooper, Peters, Robinson, W. Thorne and G. Thrupp.

Class 15 (Horological Instruments), Messrs. Cole, C. Frodsham, G. Frodsham, J. Bennett, and Webster.

Class 16 (Musical Instruments), Messrs. Chappell, Hopkinson, Clinton, Kirkman, and Metzler.

Class 24 (Tapestry, Lace, and Embroidery), Messrs. Abrahams, Biddle, J. Hyde, S. H. Northcote, and Stillwell.

Class 26 (Leather, including Saddlery and Harness). Sub-class A (Leather): Messrs. Essex, Hepburn, Pulman; and Mr. Bevington, *Chairman*.

Sub-class B (Saddlery and Harness): Messrs. Adeney, Hinton, Lynn; and Mr. Bevington, *Chairman*.

Sub-class C (Manufactures generally made of Leather): Messrs. Deed, George Norris; and Mr. Bevington, *Chairman*.

Class 28 (Paper, Stationery, Printing, and Bookbinding). Sub-class A (Paper, Card, and Millboard): Messrs. G. Chater, Chas. Cowan, Kidd; and Mr. Charles Reed, F.S.A., *Chairman*.

Sub-class B (Stationery): Messrs. Mansell, Morrell, F. Smith; and Mr. Charles Reed, F.S.A., *Chairman*.

Sub-class C (Plate, Letterpress, and other Printing): Messrs. J. N. Johnson, John Leighton; and Mr. Charles Reed, F.S.A., *Chairman*.

Sub-class D, Messrs. Bedford, Smith, Westley; and Mr. Charles Reed, F.S.A., *Chairman*.

Class 30 (Furniture and Upholstery, including Paper Hangings and Papier Mâché).

Sub-class A (Furniture and Upholstery): Messrs. Thos. Fox; Peter Graham; W. Holland; and Mr. J. G. Crace, *Chairman*.

Sub-class B (Paper Hangings and Decoration): Messrs. S. M. Hubert, Jackson, R. Trollope; and J. G. Crace, *Chairman*.

Class 31 (Iron and General Hardware).

Sub-class A (Iron and Steel): Messrs. H. Bailey, Jas. Benham, C. Hart, Rogers, and Sayer.

Sub-class B (Brass and Copper): Messrs. D. Hulett; Lambert, J. Reynolds, Steadall, and A. Tyler.

Sub-class C (Tin, Lead, Zinc, Pewter, and General Braziery): Messrs. Faraday, Glover, Prof. Leone Levi; Pontifex, and R. Wilson.

Class 33 (Works in Precious Metals, &c.). Messrs. Angell, Sebastian Garrard, Hancock, Hunt, and Parker.

Class 34 (Glass).

Sub-class A (Glass for Household Uses): Messrs. C. Gibbs, J. Hetley, Warrington, Sen., J. P. Warrington; and Mr. Sharpus, *Chairman*.

Sub-class B (Stained Glass): Messrs. E. Breffit, G. Brockwell, Pearce, Phillips, and Mr. Sharpus, *Chairman*.

The following arrangements, in addition to those already published, have been made in foreign countries and the Colonies in reference to the Exhibition:—

New South Wales.

Hon. T. A. Murray, Speaker of Assembly; Sir Charles Nicholson, Bart.; Sir William Macarthur; Hon. R. J. Want, Member of Legislative Council; A. W. Scott, Esq., Member of Assembly; Captain E. M. Ward, R.E., Dep. Master of the Mint; Rev. W. B. Clarke, M.A.; J. Campbell, Esq.; Charles Kemp, Esq.; and T. S. Mort, Esq.

Prussia.

H.R.H., the Crown Prince, President; W. G. R. Delbruck, Privy Councillor Moser, Privy Councillor Wedding; Government Judge (Assessor) Herzog; Privy Councillor of Trade, Charles; Privy Councillor of Trade, Baudouin; Hermann Eschwe, Meyer Magnus, Thomas Moritz Reichenbam, Louis Ravené, jun., and Dr. Keinheim.

The Commissioners have received information that Local Committees have already been formed in addition to those already published.

West Hartlepool.

Ralph Ward Jackson, Esq., *Chairman*.
W. Wilkinson Brunton, Esq., *Secretary*.

Shrewsbury.

The Mayor, *Chairman*.
J. J. Peele, Esq., Town Clerk, *Secretary*.

Bolton.

The Mayor, *Chairman*.
The Town Clerk, *Secretary*.

East Ripton.

W. Fisher, Esq., Mayor,
W. Newton, Esq., Town Clerk, *Secretary*.

Edinburgh.

The Right Hon. Francis Brown Douglas, Lord Provost, *Chairman.*

Thomas C. Archer, Esq., *Secretary.*

Kendal.

J. Whitwell, Esq., *Chairman.*

NOTICE TO INSTITUTIONS.

At the Conference of the Representatives of Institutions connected with the Society of Arts, on Tuesday, the 18th inst., the following resolution was carried unanimously:—

That it is advisable to have a great gathering of the members of Mechanics' and other Institutions and their friends, at the Crystal Palace on Tuesday, the 27th of August next, and that the Council of the Society of Arts be requested to assist in facilitating arrangements with the respective railway companies for excursion trains at low fares on the various lines of railway for three or four days.

The Council will request the railway companies whose lines are likely to be traversed by the proposed excursion parties, to make such arrangements with the Institutions as may enable them to send large numbers to the intended gathering. Each Institution or Union of Institutions must make its own arrangements with the railway companies.

The Directors of the Crystal Palace Company have expressed their desire to do all in their power to provide for the enjoyment of the assemblage.

Arrangements will be made for cricket matches and other games.

ARTISTIC COPYRIGHT.

A deputation from the Society of Arts, consisting of the following gentlemen, had an interview with Viscount Palmerston, at Cambridge House, on the 14th inst., upon the subject of the Artistic Copyright Bill, now before the House of Commons:—Sir Chas. L. Eastlake, P.R.A.; Mr. Wm. H. Barrow, M.P.; Mr. Wm. N. Heygate, M.P.; Mr. J. H. Robinson, A.E.R.A.; Mr. E. M. Ward, R.A.; Mr. L. Haghe; Mr. Jas. Fahey; Mr. W. M. Fladgate; Mr. G. T. Doo, R.A.; Mr. Collingwood Smith; Mr. Wm. Hawes; Mr. J. J. Jenkins, Sec. to Society of Painters in Water Colours; Mr. F. Joubert; Mr. J. Leighton, F.S.A.; Mr. W. Mulready, R.A.; Mr. W. Tite, M.P.; Mr. G. W. Hope, M.P.; Sir Edwin Landseer, R.A.; Mr. R. Westmacott, R.A., Prof. of Sculpture; Mr. J. P. Knight, R.A.; Mr. D. Maclise, R.A.; Mr. Calder Marshall, R.A.; Mr. J. R. Herbert, R.A.; Mr. S. Smirke, R.A.; Mr. G. Godwin, F.R.S.; Mr. W. J. Garnett, M.P.; Mr. J. C. Horsley, A.R.A.; Mr. A. Edgar; Mr. F. W. Burton, R.H.A.; Mr. A. Claudet, F.R.S.; Mr. Matt. Noble; Mr. Arthur Miles, M.P.; Mr. J. Walter, M.P.; Lord Henry Lennox, M.P.; Mr. J. H. Foley, R.A.; Mr. F. Y. Hurlstone, President of the Society of British Artists; Mr. J. Bonham Carter, M.P.; Mr. F. Tayler, President of the Society of Painters in Water Colours; Mr. H. Warren, President of the New Society of Painters in Water Colours; Mr. M. H. Marsh, M.P.; Mr. G. R. Ward; Mr. Edwin Field; Mr. Chas. Landseer, R.A.; Mr. Alex. Redgrave, Hon. Sec. to the Committee; and Mr. Le Neve Foster, Sec. to the Society.

The deputation, after pointing out to Lord Palmerston the importance of the early passing of this Bill, not only as regards British Artists, but as affecting the interests of Foreign Exhibitors of Works of Fine Arts in the International Exhibition of 1862, urged on his Lordship that an early day should be appointed for its being discussed in the House of Commons. His Lordship undertook to give the subject his best consideration, and communicate with the Attorney-General upon it.

ONE HUNDRED AND SEVENTH ANNIVERSARY DINNER.

The One Hundred and Seventh Anniversary Dinner of the Society took place at the Crystal Palace, Sydenham, on Wednesday, the 19th inst., the Earl of Elgin, K.T., G.C.B., in the chair.

The Chairman was supported by Earl Granville, K.G., Lord William Lennox, Sir Thomas Phillips, Sir Cusack Roney, Mr. Cumming Bruce, M.P., Mr. Wm. Ewart, M.P., Mr. M. H. Marsh, M.P., Mr. C. Wentworth Dilke, Mr. Chief Justice Temple, Mr. Edward Akroyd, Mr. John Dillon, Mr. Thomas Page, Mr. J. Lucas Chance, Mr. William Fairbairn, F.R.S., Mr. Wm. Hawes, &c., &c.

The band of the Coldstream Guards was in attendance during dinner.

The room was decorated with busts and statues of men distinguished in science and the arts, kindly lent by the Crystal Palace Company, and when the health of Her Majesty was given, a special display of the waterworks took place.

Grace having been said by the Rev. Charles Mackenzie,

The Chairman said—The first toast which I have to propose is "The Health of Her Majesty the Queen." In this company, where I am surrounded by persons who are at least as well, perhaps better able than I am, to estimate the devoted loyalty to her Majesty which is felt by that favoured section of her subjects whose habitual residence is within the precincts of this island, I need not enlarge on this subject, but having spent several years of my life in the remotest parts of this vast British empire, of which the great American orator and statesman, Daniel Webster, so beautifully said, that "its morning drum, following the sun, and keeping company with the hours, girdles the earth with the unbroken strain of the martial airs of England"—having, I say, spent many years of my life in the remotest parts of this vast empire, I venture to affirm that at no previous period of our history have her Majesty's subjects, in all parts of the world, been so united in mutual affection to the throne as they are at the present

day. I am bold to add that that happy state of feeling is mainly attributed to the respect and attachment to the principles of our limited monarchy which have been inspired by the personal virtues and constitutional practice of the reigning sovereign. I feel confident, gentlemen, that you will receive this toast in such a manner as to show that in this matter the heart of the Society of Arts beats in unison with that of the nation at large.

The toast was drunk with all the honours.

The Chairman again rose and said—The next toast I have to propose is "The Health of the Prince Consort, the President of the Society of Arts, the Prince of Wales, and the rest of the Royal Family." The Prince Consort has for long been the enlightened President of this Society, and I think that it may be said of His Royal Highness with perfect truth, that partly by his personal qualities, and partly by reason of the influence which his exalted station gives him over other minds, he has done as much as any man living to promote what I would venture to call not only the special work of this Society, but the special work of the age in which we live—to draw down from their scarcely accessible heights truths that loom upon us from the regions of abstract speculation, and fit them, under the guise of applied science, to minister to the wants, to mitigate the pains, and to multiply the enjoyments of our struggling humanity. —The Prince of Wales is fitting himself for the discharge of the high duties which will one day devolve upon him by an education which is storing his mind with useful knowledge, and his heart with the sentiments and feelings of an English gentleman. I witnessed, a few weeks ago, in the Senate-house of the University of Cambridge, a scene which was illustrative of this twofold promise. I heard a prize poem, and I must say it was a poem full of merit, on the subject of the Prince's recent visit to the Tomb of Washington, recited in the presence of His Royal Highness and of the members of the University, young and old; and when the theme reminded us of the useful and improving manner in which His Royal Highness is passing his time, the enthusiasm with which every allusion to him was received proved how completely those sentiments were responded to by that discriminating body of independent and highly educated young men of England. Prince Alfred is now in a distant part of the world, and in a climate to which anxious parents do not much fancy sending their sons, showing how well the frankness of the British sailor becomes a prince of the royal blood of England. I do not dwell upon the virtues and promises of the younger members of the royal family and those of the gentler sex, but I cannot ask you to unite with me in drinking this toast without also inviting you to join with me in the hope and prayer that the fair daughter of England, who is about to ally herself to a prince whom we hope and believe to be worthy of her, may find in her new home that domestic happiness which has hitherto been her lot within the bosom of her own family.

The toast was drunk with enthusiastic cheering.

The Chairman again rose and said—It is now my duty to give you the toast of the evening, viz., "Prosperity to the Society for the Encouragement of Arts, Manufactures, and Commerce, and success to the Exhibition of 1862," and a most agreeable duty it would be, permit me to say, if I only felt I had some hope of performing it adequately. But before I proceed to give this toast, I hope you will allow me to say a few words by way of personal explanation. When I was invited to preside at this festival, the 107th anniversary dinner of the Society of Arts, my first feeling was that I ought at once to decline to undertake a task, to the due performance of which I felt then, as I feel now, that I am by no means equal. But on further reflection, I came to the conclusion that it was better that I should expose myself to the imputation of rashness and presumption, than that I should be guilty, even in appearance, of what might seem to be a want of appreciation of the great services which the Society of Arts is now rendering, not only to the interests of this country, but to the interests of civilisation and progress throughout the world. Gentlemen, I say the services which the Society of Arts is now rendering; for, considerable as have been those services in times past, present circumstances, as it appears to me, invest those which it is now performing with a still higher degree of value and importance. Bear with me, gentlemen, for a moment, while I very briefly allude to some of the more remarkable of these circumstances. In the first place, British industry, divesting itself of all extrinsic aid, has of late, with a spirit of chivalry worthy of heroic times, flung down the gauntlet to the industry of the world, and invited them to compete with her on equal terms upon an open field, and upon an arena on which she formerly enjoyed special privileges and protection, and I must say it appears to me to be the fitting office of the Society of Arts, as a faithful squire, to furbish up and fit out the armour which is to enable her to bear herself triumphant through this tournament. This challenge has been given neither hastily nor unadvisedly, but after due deliberation—after much, and anxious, and even painful controversy, in the full conviction that the designs of Providence, for the moral advancement and the material well-being of His creatures, would be best promoted when each nation devotes itself to the work for which it is fitted by natural genius or advantages of local position, and when the products of applied industry are, through the agency of unrestricted commerce, placed in the utmost possible abundance within the reach of all. And what, gentlemen, what is the time when this challenge has been given? It is a time when, through occurrences and events which we cannot but look upon as providential, the field for such an enterprise has been extended beyond all former example and precedent. Look at those parts of the earth which, within a comparatively recent period, have been rescued by the energy of our own fellow-subjects from the wilderness or from the occupation of races incapable of turning their advantages to account. Look at Australia, which a few years ago was haunted by tribes of savages of the lowest type, and which is now inhabited by a population which consumes, I believe (I speak in the presence of gentlemen who can correct me if I am wrong), a larger proportion per head of imported articles of luxury and utility than any other nation on the face of the earth, and hence it may be reasonably inferred that there has been extracted from that formerly unproductive soil—that region which contributed nothing to the sum of human happiness—the wherewithal to pay for those imports. Look at another part of the British Empire—the vast North American region. In the north west angle of that country a colony has sprung up which bids fair in time to rival the destinies of Australia. These are regions with which I am more intimately acquainted, and I feel for them that sort of affection which must naturally spring up from having spent some years there. I am not sure I do not look back upon them as the most pleasant years of my life, because there is a satisfaction in contributing to the benefit of the Anglo-Saxon community which cannot be conferred by any other gratification on the face of the earth. Though we find no gold fields in that part of North America with which I was principally connected, I think the progress of that part of Canada was in some respects scarcely less remarkable than the progress of some of the other colonies to which I have referred—and certainly it has been more instructive, because it was so distinctly traceable to moral causes. I will mention to you one fact—a fact of which I am personally cognizant, and which I think justifies the assertion I have made. Between the year 1847, when I went to Canada, and 1855, when I left it, a period of eight years, the revenue of that colony was quadrupled, and the production and consumption in all the branches of trade increased in a corresponding ratio. Of course for such a result as this many causes will be assigned; but I am bound to say that my own opinion is that, in a great degree, it was attributable to the fact that, at that time, we converted into an applied science a truth which had been floating in

the clouds—bursting out occasionally from the clouds, but still not, up to that time, converted into an applied science—the truth that the proper way to govern our fellow subjects in these remote parts of the empire, which are peopled with our own race, is to concede to them frankly, without reservation, the privileges of self-government; to trust in their professions of loyalty, and to abstain from meddling with their affairs in matters peculiarly their own. Well, gentlemen, when we called the attention of foreigners to these growing markets in the British empire itself, it was fair that we should remind them that, true to the principles which we profess, and to the rules of fair play which we are desirous to observe in the tournament to which we have invited them, the Imperial Government rarely interferes with the perfect independence of those colonies in matters of fiscal regulation, unless it be to check any tendency that may occasionally manifest itself to create any undue protective interests. Now, gentlemen, to pass on to another part of the world—those countries which are not British colonies, and it is to be hoped never will be British colonies, but which have nevertheless been opened to the general commerce of the world, in a great measure, by the energy and enterprise, seconded by the valour and diplomacy, of Englishmen. Look at Japan, with its 40,000,000, and China, with its 400,000,000, of inhabitants. These estimates of population are so prodigious, that the bare mention of them excites a smile of incredulity, and I do not myself pretend to guarantee their entire accuracy; but there is one circumstance which it is fair to mention, and which I think should induce us to argue favourably for the Chinese estimates. It is this:—I was informed, when last in China, that the calculations we had made of the population of Canton since we were in possession of that city, tallied very nearly with the Chinese estimates; and if the Chinese census was accurate in the case of Canton, it is a strong presumption in favour of its accuracy over the empire generally. But, gentlemen, you must allow me to say, looking at the interests of commerce and civilization, and it is only in this point of view that the opening out of these countries can be interesting to us—looking to those interests, I cannot but think the qualities of these populations are more important to us than their mere quantity. I firmly believe that there are no populations with which we have become acquainted, that are more industriously or commercially disposed than are the populations of China and Japan, unless we except the populations of our own country and the United States of America; and even that exception cannot be admitted without qualification, because "Saint Monday," and strikes for a reduction of the hours of labour, are rather British than Chinese or Japanese. But, gentlemen, I hope you will allow me, while I bear this very strong testimony to the industrial and commercial aptitudes of these populations, to guard you against an error which is sometimes drawn from statements of this kind. It is sometimes said:—"If these people are so industrious and commercial, why not let trade take its chance? Why impose commercial treaties which lead to quarrels and disagreements?" The truth of the matter is, as I believe, that such an observation is founded upon a view of the character of those people, which is just as far as it goes, but which has the misfortune of being incomplete. I believe it is perfectly true that there are no people who have the commercial instinct in greater intensity than these populations; but then they have in equal intensity another instinct which is antagonistic to it, and which they share in common with all oriental nations—namely, an apprehension of foreign contact and interference which is incomprehensible to the occidental mind. In ordinary times they will not take the trouble to inquire where the goods come from, or to whom they belong; but they would only calculate at what price they would sell. When I went up into the interior of the country two years ago, to a part of China where I believe no Englishman had ever been before, the people took hold of my coat and looked at it, and they said, "When you come to trade with us we will buy this article from you." But although dormant, the unfavourable instinct is not dead, but can be excited into vitality when persons who have influence desire to invoke it; and therefore it is impossible to carry on a continual trade until you have come to some understanding with the government to prevent their stirring up prejudices unintentionally and without reason. At the same time, those present this evening will agree that it is in a still more emphatic sense our duty, now that we have come to this understanding with their governments, to take every precaution to prevent our people from exciting not only their prejudices, but a legitimate apprehension and dislike to us by any open violation of the laws of the country. I have glanced at the prospects opening up to trade in those distant parts of the world in this very hurried and imperfect manner, because I am anxious to arrive as speedily as possible at the question which is most interesting to us, namely, what can the Society of Arts do, and what is it now doing, to enable British industry to hold its own upon this new ground, and to reap its full share of the harvest of profits to be gathered there? I believe, in the first place, that the Society of Arts has conferred, in this point of view, the greatest possible services upon British industry, by advocating and promoting the renewal of the Great International Exhibition, which was inaugurated under its auspices in 1851. It would be tedious and superfluous before this audience to enumerate the forms in which these Exhibitions are profitable to British industry, but there is one point which, as it bears a little upon the topic, I will call your attention to. One of the most essential conditions to success in these new markets is a thorough acquaintance with their real requirements and wants, in order that we may direct wisely and judiciously the measures we take to meet those wants. I remember, when I was in Canada, which is accessible to all our manufacturers, I was struck with the fact that the manufacturers of the United States supplied the markets there with some articles, which came under the category of productions, in which they could not, even with the advantages of high protective duties, compete with the British manufacturers in their own country; and when I asked the cause of that extraordinary phenomenon, I was told that the British articles were not adapted to the taste and wants of the colony, and they preferred paying higher prices for American articles because they suited their wants. In the same way I remember some sensation was created in this country, amongst the trading community, by the announcement, which appeared in one of an able series of letters in the *Times*, when I was first in China, to the effect that 400,000,000 pairs of blue cotton trousers were being constantly worn in China, and that we should have the supplying of them when the trade was put upon a proper footing. I think it most important that the manufacturers should have their attention turned to this matter; but I am bound to say, that I believe that the cotton fabrics which we have hitherto sent out to China are not so substantial as those of native manufacture, and that we must offer some greater inducements, either in quality or price, before we can expect to do the tailoring business for the whole of the Chinese Empire. Here again the law of sound political economy comes to our aid; because, no doubt, the real cause of the cheapness of these fabrics in China is this—that they are of domestic manufacture, engaged in by persons who attach no value to their time, and if we make that time more valuable, they will become more extensive purchasers of the article upon which their labour can be best turned to account, and we shall in the same degree extend the market for our own manufactures. I believe, then, these exhibitions render us the greatest possible service, by placing under the eyes, not only of our manufacturers, but also of our artizans, specimens which will enable them to ascertain what are the real requirements of the markets, and how far, in our present condition of industrial progress, relatively to other nations, we may hope to supply those wants. But, gentlemen, it is not enough that we should find out what we

can do in our present condition of industrial progress. We must go further. We must endeavour to better that condition by removing defects, where such exist, and by aspiring to the highest standard of excellence in any department in which other nations have risen to a step beyond us, and whether this object is to be effected by developing the intellectual qualities of our artisans, by finding out new sources of supply of the raw materials, by adding increased beauty and finish to designs, by improving the machinery which facilitates and cheapens production, or by bringing in aid chemistry and kindred sciences to remove difficulties which are created by difference of climate and other causes—in these and all other efforts for the advancement of British industry, the Society of Arts has been ready to take the lead. Its records attest the truth of that assertion. From an early period it has promoted improvements and stimulated the genius of inventors by premiums and rewards; and at a later period it has identified itself with the educational progress of the artisan classes by establishing examinations and uniting itself with Institutions which have this object in view. I feel some delicacy in alluding to these matters, and to what the Society has done, in the presence of gentlemen who are not only better qualified to give you information on these points, but better qualified for the best of reasons,—that they have been instrumental in giving this wise and salutary direction to the exertions of this Society. I am sure I shall meet with universal assent from every individual present here when I name my noble friend, the Lord President of the Council, as one who has earned for himself not only the gratitude of the members of the Society, but the gratitude of the whole population of the empire, by the exertions he has made, both as a commissioner for the Exhibition, as head of the Government department of education, and as a member of the Cabinet, to promote the cause of education and the interests of industry throughout this land. There are others whom I may not venture to name. I can only hope some of them, as well as my noble friend, will make some statements to you this evening which will supply in some respects the deficiencies of your Chairman. In the mean time, gentlemen, I beg to propose to you that we drink, "Prosperity to the Society of Arts and success to the International Exhibition of 1862," and I beg to couple with that toast the name of Sir Thomas Phillips, Chairman of the Council.

The toast having been duly honoured,

Sir Thomas Phillips, F.G.S., said—I hope I shall receive your favourable consideration in having, from my official connection with the Society, to follow the eloquent address of the noble earl in the chair, because I most unfeignedly feel that his lordship has exhausted the whole subject-matter of the evening, in so far as the Council of the Society of Arts are concerned. I remember being present, some years ago, when another noble earl (Lord Granville), who has honoured us with his presence to-day, characterised the Society of Arts as an "aggressive" body that would undertake any duty that seemed to offer itself. I remember a witty divine to have once said of one of the noble lord's distinguished colleagues, Lord John Russell, that he would undertake to perform a difficult surgical operation, or to build up St. Paul's, or to command the Channel fleet at an hour's notice, or without one. Now, though that may sound something like a reproach, give me leave to say that it indicates qualities that overcome difficulties, and although we may sometimes have been disposed to blame that noble lord for failures, yet his character will be reverenced throughout all time for what he has successfully accomplished. Remember, gentlemen, it is only by being aggressive, and stemming difficulties, that those difficulties can be overcome. The men who quietly discharge the ordinary duties of life in a very proper manner, and never encounter failures, are not the people who really influence society. Therefore, I do not regard it as a reproach that the Society of Arts should be termed an aggressive body. His lordship has so feelingly alluded to the discharge of the duties of the Society of Arts, that I feel myself bound to some extent to justify what his lordship has said of us. He has described the progress of the country during a century, more remarkable perhaps in many respects, than any period which has existed in the history of the world. He has described the history of the country, to which nothing can compare the triumphs we have achieved—not so much at home in our old country—in spreading the Anglo-Saxon race and the Anglo-Saxon language throughout the four quarters of the globe. It may be said that the Society of Arts has not much contributed to that result, but it has been the commerce of England which has contributed to the spread of civilisation; and if the Society of Arts has in any shape discharged its duties, it has been by promoting the manufactures and the commerce of England. I would allude to some very few matters which the Society has undertaken within the last year, and, in so doing, I especially allude to its aggressive character. Many gentlemen present may be ignorant of the fact that up to this moment artists have no copyright in their own works—that is, by the law of England they are not protected in the engagement of the labours of their own hands, or the production of their imagination It may be asked—why should the Society of Arts take that matter up? There is a Royal Academy of Painting and Sculpture, which is the more fitting body to take up a question of this kind; and if the Society of Arts had been simply desirous to consult its own ease, it might fairly have said, "Let the Royal Academy take it up." But it did not give that answer. It came to the conclusion that a country which did not protect the producers of the fine arts in the enjoyment of the fruits of their own talents and labours, was wanting in its duty to a class of men which exercise a large influence upon the social condition of the people; and we said we should appeal to the legislature, and ask that artists might be protected in the works of their hands, and I trust, whatever may become of the Bill, in the preparation of which the Attorney-General has kindly given his able assistance, and which he has with the sanction of Government introduced into the House of Commons, we shall never rest satisfied till the law has affirmed that the artist ought to be protected in the enjoyment of the fruits of his labours. The noble Chairman has alluded to the educational examinations of the artizan classes of this country. That, I apprehend, we are all agreed in regarding as one of the most important duties that the Society for the Encouragement of Arts, Manufactures, and Commerce, can discharge. There is nothing in the times in which we live so important as the skilful application of science to the industrial products of the country. We have invited all the world to compete with us in works of industry. We shall only succeed in that competition in proportion as we apply the useful sciences in aid of labour for the production of industrial works. The only remaining topic to which I will direct your attention is that of the International Exhibition of 1862. I do not think his lordship has overstated the importance of the Exhibition of Works of Industry and Art. I do not think it possible to indicate too strongly the importance of such exhibitions with reference to the industrial classes of the community. Educated as they are to special objects, and confined to a narrow circle of observation, it is most important that we should enable them to see the mode in which other countries, and other people, bring about results which they themselves also bring about, but in a different manner. You thus elevate their intellectual character—improve their moral taste; you remove them from those more sensual gratifications which are the temptations of their class; you raise them in the scale of society, and a greater boon it is impossible for this Society to confer upon so large a proportion of the community as the skilful artizan forms in this our time. With reference to the Exhibition itself, if there be any one in this room who entertains doubts of its success, I recommend him to read the paper lately read before the Society of Arts by my friend Mr. Hawes, which

I think settles that question most conclusively, and will remove doubt from any one's mind with regard to the ultimate success of that exhibition. For the success the Society of Arts has hitherto met with in promoting that Exhibition it has been indebted chiefly to two causes; first, to the public confidence which enabled us to start with nearly a thousand enterprising guarantors, who readily undertook to provide the funds, if required, to carry out the exhibition to a successful termination. But, besides the importance of that guarantee, the success of the Exhibition will be attributable to the good fortune of the Council in securing the services, as Commissioners for the Exhibition of 1862, of gentlemen who, from the first moment their names were brought forward, received the confidence of the public—I allude to Lord Granville, the Marquis of Chandos, Mr. Baring, my friend Mr. Wentworth Dilke, and Mr. Thos. Fairbairn. I do not know what you, gentlemen, feel, but I have ever, from the first, felt much gratitude to those gentlemen for having undertaken duties which must be very onerous, very anxious, and which, if the Exhibition did not succeed, would undoubtedly be very thankless. But I believe you will agree with me, in thinking that even if success were more doubtful than it is, we should still owe to them a debt of gratitude for having undertaken that duty. They have adopted those measures which it would be your desire they should adopt. They have obtained, not only the adhesion of English manufacturers and English capitalists for the undertaking in which they are engaged, but I believe, without a single exception, they have obtained the adhesion of all the great powers of Europe who are prepared to enter upon the contest with you next year; whom I hope you will meet in the spirit of generosity in which it behoves you to meet them, but we trust you will at the same time do all in your power to maintain the reputation of your own country in that Exhibition. I have only one further remark to trouble you with, and which I would offer in the presence of the Royal Commissioners for 1862. In the paper to which I have alluded, Mr. Hawes directed attention to the great importance in his view that every possible facility should be given to the artisan classes to benefit by the Exhibition of 1862. I feel persuaded that that opinion pervades the minds of the Commissioners themselves; and it is only to strengthen them—if they require strengthening in the matter—that I would reiterate the great truth, that no influence the approaching Exhibition can exercise can be of more—nay, can be of equal importance—to the education of the artisan classes of this kingdom. Gentlemen, I beg to propose to you—"The Health of the Commissioners for the Exhibition of 1862," and I desire to couple with the toast the name Earl Granville.

The toast was drunk with long continued cheering.

Earl Granville, K.G., spoke as follows:—There is a rule which is observed in that place where I have the pleasure of meeting my noble friend frequently, that no allusion is to be made to former debates. I do not know whether a similar rule holds good in the Society which I have now the honour of addressing; but in that case my friend Sir Thomas Phillips has somewhat transgressed that rule. He has made a great charge against me of having, on some former occasion, the date of which, however, he does not give, accused the Society of Arts of being of an aggressive character. Now, I do not remember ever having used that particular epithet. I think it is possible that I may have said that the course which the Society of Arts pursued was bold, was energetic, and in the heat of debate I may have been led away to use the word "pushing," or "aggressive," but I felt I then pointed a moral, that, being an aggressive body, the Society of Arts took a place which more timid persons declined to take, and accomplished great objects, which have not only raised their credit and increased their numbers, but which have been of infinite service to the state to which they belong. There is one function of the Society of Arts which I have always had, when circumstances have permitted, great pleasure in associating myself with—I mean when they meet at the Crystal Palace for the purposes of refreshment and agreeable communion. In the first place, I was glad to come here this evening, because, in my estimation, this annual dinner of the Society of Arts is, of all the public dinners I know of, remarkable for its pleasantness, on the one hand, and the shortness of its proceedings on the other. I am glad to be here, in the first place, to support my noble friend on my right, to support an old college friend, of whom a few minutes later you will allow me to say a few words; but I am especially glad, and I repeat the sentiments I am sure of my fellow Commissioners, in stating that it is a great satisfaction to us to show this mark of respect for the Society of Arts, to show the gratitude which we feel for the confidence which they placed in us on a former occasion, and still more now by designating us as the Royal Commissioners for the ensuing Exhibition of 1862. I must say that feeling has been increased by the kind and cordial manner in which you have received the very flattering, exaggerated, and I might almost say Chinese compliments which my noble friend has passed upon me, but without alluding to that admirable paper which most of you heard, and which I hope all have read, by Mr. William Hawes, respecting the Exhibition of 1862, enough I think has been said by my two friends, who have preceded me, almost to exhaust the subject, as far as such a subject ought to be exhausted in a convivial meeting. With regard to the toast to which I have to respond—that of the Commissioners for the Exhibition of 1862—I know there is nothing more distasteful to an audience of this sort than to speak of one's self, but there are one or two topics connected with our acts as Commissioners, to which I would allude very briefly. In the first place, then, after the Society of Arts had done us the honour to propose to us to manage this Exhibition, we showed no undue haste in complying with that request. I have sometimes felt that we may have exposed ourselves to the charge of having wasted some precious time before we gave a final answer to that request; but upon the whole, and upon reflection, I have not the slightest doubt that that time was not ill-spent. I think, even though backed by the powerful influence of the Society of Arts, if we had rushed into the undertaking before it was clear that the public were of opinion that another exhibition was desirable, and that the time was come for that exhibition, we should have been doing that which would not have conduced to final success. But when we saw that guarantee list raised to such a very large amount, when we considered the difference in some respects between that guarantee list and that of a former occasion, I think there would be no doubt on our minds, and no doubt on the minds of those who reflected upon the subject, that the deliberate opinion of those who were most qualified to form a sound judgment on the matter was, that such time had arrived. As one officially connected with the last exhibition, I cannot but admit that there was never any doubt but that, at some time or other, it would have to be revived. That was only a natural result of the success of that exhibition. It was stated by an illustrious personage, who was one of the earliest promoters of that great enterprise, that the object of the exhibition was to give a test, and, as it were, a living picture of the actual advancement of mankind at the present moment, and to serve as a starting point from whence, from time to time, to examine how far the exertions of mankind had carried on the great process of civilization. If we had been satisfied with that one success, and had then rested upon our oars, the exhibition would have been successful certainly at the time; but with regard to its influence upon the future progress of the arts and manufactures of the country, it would have been of no value at all. The response that has been made to the proposition of the Society of Arts by the large list of guarantors, and the fact of intending exhibitors having already applied for three times as much space as the Commissioners can afford, shows that the time for holding another exhibition has arrived. We are moreover further confirmed in this fact by knowing that it was the intention

of the Emperor of the French to have had such an exhibition next year if we had not come forward as we have done. As soon as we assumed our duties, there was one very important point which we carefully considered; we were advised by some persons, whose judgment we could not but respect, that regarding the various circumstances which might affect the coming exhibition, it would be judicious to restrict the scale on which we were to carry out the enterprise, and that we should do it on a less extensive scale to what was done in 1851. We carefully considered such suggestions, but we decided that not only for the credit of the country, but also for the pecuniary interests of the guarantors, if we went into the work at all, we should go in for a success and not for a failure, and if we did go in for a success, supported as we expected to be, and as we find we are in this country and also in foreign countries, we should, with the exercise of a tolerable amount of prudence and business-like habits, achieve a like success to that which attended the exertions of the Commissioners in 1851. I have not myself attended to the details of the last census, in a way which I have no doubt some statistical members of the Society have done, with regard to the bearing of that census upon our expectations. I cannot calculate how many millions of people are now of an age to enjoy an exhibition who were unable to enjoy such a thing ten or eleven years ago; but there are one or two prominent facts which present themselves; such as that there are more than 2,000,000 of increase of population, that increase having taken place in the great centres connected with the metropolis by the railroads which bind the country together; and in this very metropolis there is not less than 500,000 increase of that population which furnished the principal number of visitors to the late Exhibition. As to the co-operation of foreign nations, nothing can exceed the assurances we have received as to the intention of those powers to come forward both in their own interests and as a mark of courtesy to the British nation to co-operate in this great work. Commissioners have been appointed in most foreign countries. In France the President of the Commission has been appointed in the person of a prince very near to the throne, whilst the governments of other nations have appointed to that office men most distinguished in science and in arts; and therefore, I say, I look for cordial co-operation from those quarters. The noble Chairman, in the magnificent speech he has given us, has, with singular felicity, laid down the great principle of self-government as applied to our colonies and to ourselves. Now, gentlemen, I believe that that power of self-government, which has so mainly distinguished the Anglo-Saxon race, partly proceeds from the character of the race, and partly from the habits it has been brought up in. I believe if you look to the history of the Society of Arts, or if you look to the question of this great Exhibition, we may say there is one point in which we defy all Europe to compete with us—that is in the results which we produce from voluntary efforts and voluntary associations. We wish, as the Commissioners of 1862, to carry out that principle as far as possible. Our object is, in this exhibition, to request the leading men of districts, and the leading men of particular trades, to take upon themselves, as much as possible, the duties and responsibilities of managing that with which they must be so much better, and so much more intimately acquainted, than any other body can be. The only step which we shall think it right to take is, after explaining the general principles, keeping a watch over the different committees who have so kindly and cordially agreed to co-operate in this matter, to protect the just rights of minorities, and to prevent the necessities of the masses from being overruled by the authority of the few. This, I believe, is the right principle to pursue, and then I think we cannot fail of success. I look forward, therefore, to the next year with great expectation. It has been the custom of all countries to have their commemorations. Amongst the most famous of these were those of the Greeks, and we know the importance they attached to them. They gloried in their Isthmian games, and we in England have a sort of national commemoration in our great Derby Day. I trust I shall not lower myself in your estimation when I say that there are few events which are so thoroughly enjoyed by me as the Derby. I trust, further, I shall not lower the character of the government with which I am connected, or so far confirm the axiom, "How little wisdom governs the world," when I say that several of my colleagues in the government take the same interest as myself in that event, and that they did not hesitate to postpone the vexed question of the Galway Packet Contract for the sake of witnessing the Derby. Yet, although we may feel an interest in the contests between animals for which Englishmen feel an instinctive affection, that does not debar us from taking the greatest interest in contests of a higher order between man and man in the peaceful pursuits of arts and manufactures, realising that which has been eloquently described as the power which the Almighty has given to man to make use of the material world, and to command the elements, so as to afford the greatest degree of comfort and happiness to humanity over the world. Sir Thomas Phillips has alluded with great feeling to the interest which the working man has in the approaching Exhibition. There will be an advantage in every class of the community enjoying it, and I feel, whether it is for the manufacturer or the producer, or the consumer, it will be of the greatest possible advantage to the working man and artisan that he should know, not only what we are doing ourselves and what progress we are making, but that he should also have the opportunity of testing the progress that is made by foreign nations in those industries and arts in which he is engaged. I hope, with attending favourable circumstances, with the prospect of good harvests, with fine weather, with the blessing of Divine Providence upon the work, with the peace of the world maintained, of which no man can speak with certainty, but about which the minds of men are more reassured than was the case some time ago, and with the distant hope, but which it is impossible to prophecy, that our countrymen on the other side of the Atlantic may either become reunited in a peaceful bond, or separate without a recurrence of the dreadful horrors of war—I believe, with the assistance of the highly progressive and highly intelligent Society here present, the Exhibition of 1862 will prove—I will not go so far as to say a great success, but, at all events, not discreditable to the great nation which now offers its hospitality to the nations of the world. The noble earl, in feeling terms, expressive of the friendship which had been formed in college days, and cemented by the associations of after years, concluded by proposing, "The Health of the noble Chairman."

The toast was drunk with all the honours.

The Chairman said—I am overwhelmed by the kindness of the terms in which my noble friend has proposed my health, and by the enthusiastic manner in which you have been good enough to receive the toast. If it be true that I have, upon some occasions, undertaken duties of a somewhat difficult and responsible character, I can only say that I have been encouraged to do so by the confidence, which has never deserted me, that my acts and my motives would receive generous interpretation, both from the government which I served, and from the public of the country. As my noble friend has said, nothing is more disagreeable than to have to speak of one's self, and I frankly confess, one of the most disagreeable part of one's return home, after some long absence in a distant country, which one's friends are naturally anxious to hear about, is that one finds one's self in a position in which one cannot help talking about one's self. I would say, with reference to what fell from Sir Thomas Phillips, when he alluded to the colleague of my noble friend, who was prepared to undertake anything at any notice, I can tell you what suggested this idea to Sir Thomas Phillips. I said to him a moment before, that people had wondered at my audacity in going into Pekin, but that I thought it ten times more audacious in me to take the chair at the dinner

of the Society of Arts. Your reception of me, however, has been so kind, that I cannot anticipate any limit to the acts of audacity I may be capable of perpetrating hereafter.

Mr. Hawes said—Whatever difficulty Sir Thos. Phillips may have felt in addressing you, after the very eloquent speech of our noble chairman, that difficulty is undoubtedly increased in my case, by having to follow, not only the noble chairman, but the noble lord who has just sat down. But, gentlemen, the toast which the Council of the Society has entrusted to me is so comprehensive and of such vast interest, that I hope, in the short time that I shall detain you, to be able, at any rate, to interest you, and to prove that the Council, in selecting it as one of the toasts of the evening, have justly appreciated the great interest which all feel in everything relating to the subject of it. I am entrusted with the toast of "The Colonies and our Dependencies," which are of such vast value in the production of almost everything necessary to the advancement of the Arts, Manufactures, and Commerce of this country. The members of this Society cannot but feel an interest in the progress of our colonies, an interest in their prosperity, and an interest in the advantages which will be derived from a successful pursuit, in those distant lands, of the three great objects which this Society was instituted to promote. Gentlemen, it has been already remarked, but in other language, that the sun never sets in the dominions of our Queen; and so we may say of this Society, that wherever our commerce extends, there its influence extends; and I feel sure that that influence is now being exerted with greater energy than at any previous period, in all parts of the world, to promote commerce and civilisation, and all those arts which tend to the improvement of the native populations, however depraved, however uneducated, and however ignorant they may now be of the true principles of commerce and industry. My lord, the effect of that industry and that immense power which this country possesses, and exercised as it now is, and extended over the vast districts included in our colonies and dependencies, must be to raise England higher in the estimation of the world than she ever previously stood—to place this country before the populations of the most distant lands in a prouder position than she ever before occupied, and I hope I may say to make her more respected in the world, as the protector of commerce, as the protector of civilisation, and as the protector of liberty, wherever her influence and power may be felt. The policy of this country has vastly altered. Formerly, wherever we planted our flag we had previously conquered the people; now we plant our flag and ask the people to trade with us—to enter upon friendly relations with us. We do not conquer them, but we use our influence to induce them to open their ports to all the world; not to us exclusively, but to all the world, trusting to our energy, power, and industry to give us the preference, and to enable us, as the pioneers of civilization, to secure a fair share of the advantages of trade; and I am proud to say the country owes a deep debt of gratitude to the noble lord who occupies the chair, for the able manner in which, in a distant country, and among a people entertaining deeply-seated prejudices against us, he has enlarged the sphere of our commerce, and increased our political influence; and I hope I may be allowed to say that few governments have, I think, been under greater obligations to a representative than that of which the noble lord, who last addressed us, is a member, is to the noble earl in the chair, and of which government, in its foreign and colonial policy, most of us have been earnest and ardent supporters. To our colonies we are indebted for large supplies of food; to our colonies we owe the great supplies we receive of the necessaries and luxuries of life; we owe to them our supply of tea, and coffee, and sugar, and rice. If we bought that food, and those luxuries only from them, and gave them nothing in return, our colonies would be of infinite importance to us all: but of how much greater importance are they to us when they take, in return for these necessaries and luxuries, the industry of our people, and pay us with commodities which promote the comfort, the happiness, and the well-being of those who are employed in their manufacture. Gentlemen, looking from whatever point of view we may, our colonies are of such immense importance to this country that no time of this Society can be misapplied which it devotes to any subject that tends to bring before the public view their industry and their products, and encourages the public to consider in what way that industry can be best fostered and encouraged; to ascertain in what direction their investments can be made most beneficial to the colonies, and to the mother country. This Society has for a long time past had a Committee which has devoted itself to these inquiries, and all I can say to you now is that I hope, by the support that you will give us, that that Committee will become more useful than it has ever yet been, and that in time to come it may show you that the Society of Arts has done as much service for our country, in the colonies as at home, and is entitled, by its usefulness, to receive from you a strong mark of your approbation. Gentlemen, if the Society receive that from you its labours will be amply repaid, and we shall look forward to its progress with greater confidence than hitherto, relying upon the absolute good that we do to merit public support. I ask you, then, to allow me to propose that we drink the toast, or rather the sentiment of "Prosperity to our Colonies," and may the power and influence of this country not now extended by conquest, but by peaceful intercourse, be increased year by year, and prosper as it has hitherto prospered. May that power from over which the sun never withdraws its influence be yet extended; and may our Queen see those colonies and distant dependencies increasing under her reign in wealth and civilisation in a still greater degree than they have ever yet done.

Mr. M. H. Marsh, M.P., said—The task of returning thanks on behalf of the Colonies, with reference to Arts, Manufactures, and Commerce, has been deputed to me. With regard to the last named, I think our colonies may eventually take up a high position. We not only enrich ourselves with these material productions, but the work we are carrying on in our colonies is doubly blessed—"It blesseth him that gives and him that takes." I have myself seen regions of the earth where nothing was visible but barren rocks and trees, but after the Anglo-Saxon had gone there the desert had been turned into a paradise; houses, gardens, churches, and schools, have sprung up in a few years, and all that is good and full of promise. There are, I am aware, those who think that art is not the destiny of our Colonies, that to others it has been given to produce the breathing canvas and the living marble, whilst to the colonies it has been given only to replenish the earth, to conquer and subdue the nations, and to fill the regions of the south with our own sturdy race and our own noble Institutions and literature. But for my part I can see no inconsistency between high art and commercial enterprise. We see the ancient columns of Greece along the shores of the Mediterranean where ancient commerce flourished; these are left as monuments which we try to imitate, but can never surpass, and I can see no reason why, at some future period, our colonies should not turn their attention to high art and produce monuments of equal beauty. When I look around this noble building—when I look at the general state of society in this country, and see the progress which has been made in art within the last few years, and when I consider that this Society has had its full share in this great work, I do not despair, with the interest that is felt on the subject in this country, that the day is not far distant when our colonies may be as well known for arts as they are now for commercial enterprise and industry.

Mr. William Ewart, M.P., said—The subject to which I have very briefly to call your attention is that of the Examinations instituted by this Society. It is a peculiarly appropriate subject in the presence of the noble lord, the President of the Council, and a member of the Government which has bestowed upon the country the benefit of

the system of competitive examination. What has been the progress of this Society in these examinations which it has so beneficially instituted throughout the country? I find that at present we may boast that we have 300 Institutions connected with us for the purposes of examination. I find the number of candidates examined this year was 750, which was an increase of 164 upon the number of candidates last year. I find that the number of places where examinations have been carried out is now 81, being an increase of 18 on the preceding year. I find that the subjects on which the competitors have been principally examined are Algebra, Bookkeeping, and Arithmetic. Again, I find that a leading subject of examination has been the French language, which affords me peculiar gratification, because, with our greatly enlarged commercial relations with France, I am happy to see that a corresponding attention is being given to the acquiring of a language which will be brought more into request than ever. I am also rejoiced to find that in the subject of drawing there has been an increase in the number of students in the present year, because, in a country like this, drawing is a subject of the greatest consequence. It is a fact, gratifying and worthy of especial notice, that the great majority of these 750 examinees belong to the mechanical classes of the community; others are warehousemen and clerks, who are content to limit their hours of recreation for the sake of availing themselves of the advantages of the Examinations of this Society. It is gratifying to find that these Examinations have created so deep an interest, and that it is upon such a foundation that the prosperity of this country is established, for it adds to the vitality of the freedom of England to extend these examinations. It is, therefore, with great pleasure that I give you, without further comment, "Prosperity to the Institutions in Union," accompanied by the hope that they will extend to the utmost limits of the kingdom, and that they may gain strength and influence as they increase in numbers.

The toast having been duly honoured,

Mr. Akroyd said—As the representative of an Institution in connection with the Society of Arts, for myself and my brother representatives I beg to return thanks for the cordial manner in which the toast had been received. But I should imperfectly discharge my duty if, whilst acknowledging the compliment, I did not gratefully admit the benefits which the associate Institutions have received from their connection with the Society—benefits which are mutual, for whilst through its branches the central Society derives information as to the wants and feelings of the working classes, as to the requirements of the arts, trade, and commerce of the country, on the other hand, the branch Institutions receive from the central body renewed strength and vigour, with a wholesome supervision. It is an immense field which the Society has undertaken to cultivate, and nobly has it fulfilled its task. Much as it has already accomplished, more remains to be done. As a British manufacturer, I beg to thank the noble chairman for his practical remarks. Allusion has been made to the friendly tournament in which the British and French manufacturers are about to engage. I am not afraid of the contest. In fact, the English manufacturer has already entered the lists under every disadvantage. French goods are now admitted free into this country, whilst British goods are excluded from France until the new treaty comes into operation. I am free to admit that, in the higher class of art designs, in novelty of effect, in brilliancy of colour, the French have the superiority. Nevertheless, the English have their peculiar excellences, and in neat, quiet styles of subdued taste they carry off the palm. With free competition, each nation will discover its own characteristic qualities, and develop its own genius. Neither will gain any sweeping advantage, or drive the other out of the market, but each will be benefited. I recently came in contact with a French gentleman from the manufacturing districts in France, and that gentleman impressed me with respect for, and a high opinion of, the French manufacturers as a class. The gentleman in question gave me to understand that there was a vague alarm amongst the French manfacturers that England would deluge them with her cheap goods, and that he, at first, shared that alarm, but on comparison of prices, and from observation, he discovered that his fears were exaggerated, and when he returned to France his alarm had subsided. Warlike rumours have been afloat, and are still rife, but in my opinion the forthcoming Exhibition offers the surest guarantee for peace. It will promote friendly intercourse betwixt the two people, it will excite a friendly feeling, and strengthen the bonds of friendly alliance.

ANNUAL GENERAL MEETING.

Wednesday, June 26, 1861.

The Annual General Meeting for receiving the Council's Report and the Treasurer's Statement of the Receipts, Payments, and Expenditure, during the past year, and also for the Election of Officers, was held on Wednesday, the 26th inst., at 4 p.m. William Hawes, Esq., Member of the Council, presided.

The Secretary having read the Bye-Laws relating to the Annual General Meeting,

The Chairman said that, by the Bye-Laws, he was directed to nominate two gentlemen to act as scrutineers of the Ballot for the election of officers. He would ask Mr. Dennis and Mr. Robertson to undertake that office.

Those gentlemen having consented to act, the Chairman declared the Ballot open. He then called upon the Secretary to read the

ANNUAL REPORT.

In compliance with the Bye-Laws of the Society, the Council, on their retirement from office, at the Annual General Meeting of the members held this day, lay before them an account of their proceedings and of the business of the Society during their year of office.

Artistic Copyright.

A considerable amount of attention has been again devoted to this subject, and the Society's Committee, under the chairmanship of Sir Chas. L. Eastlake, the President of the Royal Academy, has held many meetings. The members have been fortunate enough to enlist on behalf of the Bill the sympathy and valuable assistance of Sir Richard Bethell, M.P., Her Majesty's Attorney-General, who has undertaken the charge of the Bill in the House of Commons, and has taken an amount of interest in the subject and bestowed an amount of time and labour in perfecting the Bill, which could scarcely have been expected from one the calls upon whose time and thought are so numerous and so pressing. The Bill, though substantially the same as that of last year, has been, under the superintendence of the Attorney-General, greatly improved, and as the members are aware, has been introduced into the House of Commons as a Government Bill, and it now stands waiting for Committee. The unusually protracted debates which have taken place

on the general business of the Government have delayed the progress of the measure. A very large deputation from this Society, a short time since, had the honour of an interview with Lord Palmerston, when they pressed upon his Lordship the justice of this Bill, and urged the special importance of its being speedily passed, looking especially to the interests of the International Exhibition of next year, when foreigners are invited to exhibit their productions in the Fine Arts. The deputation pointed out that unless some day could be speedily fixed for its discussion, they feared that the Session would pass away without any result, and they earnestly requested his Lordship to arrange for some time when the matter could receive the attention of Parliament. His Lordship has undertaken to give the matter his best consideration, and it is hoped that a definite day will be fixed, when the Attorney-General will have an opportunity of explaining the clauses of the Bill, and taking the sense of the House of Commons upon its provisions.

Committees.

The members of the Gutta Percha Committee have been continuing their inquiries during the Session, and their report is now in the course of preparation.

The Surgical Instrument Committee is occupied in preparing lists required for the Exhibition of next year, and it is hoped that, through their agency, that department of the Exhibition will be far more complete and valuable than it was in 1851.

The members are aware that the Council had in contemplation to get together, for Exhibition on the walls of this room, a collection of the works of the late Robert Leslie, R.A. A Committee was appointed to take charge of this matter; they held many meetings, and communicated with the owners of the principal works of that artist. Her Majesty the Queen at once consented to lend the pictures in the Royal Collection, but too small an amount of support was received from other quarters to render it possible to get together such an Exhibition as would do justice to the painter and be attractive to the public. The Council were, therefore, compelled most reluctantly to give up their intention, and they feel assured that the members will sympathise with them in their regret, not only for the loss of a highly valuable and interesting Exhibition, but for the opportunity of paying a tribute of respect to the memory of a charming and favourite painter.

During the year, the Council have had under consideration the importance of getting established

District Museums and Galleries of Science and Art,

and upon the recommendation of the Committee to which this question was referred, passed the following resolutions:—

1. That the Society of Arts will promote the establishment and improvement of District Museums and Galleries throughout the United Kingdom, where objects of art and science may be exhibited, at times and under regulations which shall afford to all classes of the people the greatest advantages.

2. That the course of action of the Society shall be, to endeavour to bring District Museums into connection with this Society, the British Museum, the National Gallery, the South Kensington Museum, Kew Gardens, and other national institutions, and with private Societies, such as the Royal Horticultural, the Royal Botanic, Zoological, Chemical, and Microscopical, with the view of establishing a systematic circulation of objects among District Museums; to endeavour likewise to promote contributions from public bodies and private individuals for the same purpose; to hold conferences from time to time when the subject may be discussed; to seek the sssistance of Parliament when necessary; and generally to assist in promoting the objects in view.

3. That a General Committee be appointed to promote these objects, to consist of the Council of the Society, the representatives of all Institutions in Union and the promoters of district museums and galleries, with power to add to their number, and to appoint the necessary subcommittees.

4. That a General Meeting shall be held at the Society's Rooms, to which influential persons desirous of promoting the proposed objects shall be invited.

This subject is still receiving consideration, and it is hoped that the Council shortly will be in a condition to bring the matter before a public meeting. The Lord Mayor has taken a considerable interest in it, and has consented to allow the use of the Mansion-house for the meeting, and to preside on the occasion.

The Company of Painters Stainers.

In consequence of a communication from the Worshipful Company of Painters Stainers, seeking the aid of the Society of Arts in promoting the objects that body had in view, a Deputation from that Company met a Committee of the Council, and from the report of this Committee the Council learnt that the Company had, last year, for the first time, held a Public Exhibition of the Works of Artizans in Decorative Arts, and that the Company's Second Exhibition of Specimens of Marbling, Graining, Arabesque, Glass-work, and Mediæval and Ecclesiastical Ornament, would be opened at Painters' Hall on the 1st of the present month of June; that foreign and native operatives might send in specimens of their works on the same terms; that the Exhibition would be free both to the competitors and the public; that the Company and the Exhibitors would name three, and two, of the judges respectively; and that to each of the successful competitors in marbling, in graining, in writing, and in decoration in oil or distemper, the Company would award not only a certificate and a prize, but also a gift of its freedom.

It appeared, also, that the Company desires to establish a school, with lectures and classes, where

operatives may receive instruction in the various arts of decoration.

The Council subsequently, in a letter to the Company, said—" The importance of industrial instruction in a great commercial and manufacturing community can scarcely be estimated too highly. To do justice to the industry, perseverance, intelligence, and manly spirit of the artizans and mechanics of the United Kingdom, an education, not of the head alone, but of the head, hand, eye, and taste, is obviously needful. The Society of Arts, by its system of examinations, certificates, and prizes, has done something to stimulate the industrial classes to strive after that education of the head which they greatly need; but though nearly one hundred Local Boards of examination have sprung into existence to co-operate with the Society in the prosecution of that object, the Society has not as yet seen its way to the creation of any satisfactory machinery for stimulating and testing, by competitive exhibitions or otherwise, the education of the hand, eye, and taste, that practical skill, dexterity and refinement, which, no less than knowledge, are necessary to the success of the artizan and mechanic in their various arts and handicrafts."

The Council have gladly welcomed the Painters Stainers as coadjutors. They consider that their project is capable of valuable extension, and may serve to indicate to other ancient corporations and independent public bodies, an opening whereby, through similar or analogous means, they may renew that usefulness which time, in some measure, and in some particulars, has somewhat impaired.

In compliance with the Company's request, the Council of the Society of Arts nominated three gentlemen, viz., Mr. William Dyce, R.A., Mr. J. Gregory Crace, and Mr. Peter Graham, who obligingly consented to be associated with the five judges, above referred to, at the forthcoming Exhibition; the decisions (of the eight) to be given in the name of the Painters Stainers Company—not in the name of the Society of Arts. If, however, the three gentlemen nominated by the Council should find among the specimens two or three which should appear to them to possess peculiar merit, they were authorised to recommend them for some special recognition by the Society of Arts.

The Council also assented to the proposal that when the Exhibition was closed at Painters' Hall, the Company should send to the Society's House for further Exhibition here, a selection of the most meritorious and interesting works.

The Council also voted Ten Guineas as a contribution to the Company's Prize Fund.

This Exhibition is now open to public view at the Company's Hall, Little Trinity-lane, and Medals and Prizes have been awarded, the particulars of which will be given in the *Journal* when the Judges' Report is received.

The Council's correspondence with the Painters Stainers was communicated to the Annual Conference between the Council and the Representatives of the Institutions in union with the Society; and, after the subject had been discussed, the following resolution was unanimously passed:—

" That as exhibitions of works of skilled labour have a powerful tendency to encourage improvements in manufacturing industry, and at the same time to improve mental cultivation, it is desirable that such exhibitions should be held in connection with the principal provincial Institutions, wherever practicable, as well as in the Metropolis, and that Schools of Science and Art be specially invited to co-operate therein."

The Council is not prepared to prescribe the conditions on which such Exhibitions, whether competitive or not, should be held. The details might be varied in various places, and in relation to various objects. The subject is full of importance, and should be carefully ventilated.

International Exhibition of 1862.

The business which has, however, principally engaged the attention of the Council during their year of office, has been the International Exhibition of 1862. The last report stated that the promises to the Guarantee Fund exceeded £300,000, and that the Council were in communication with the proposed Trustees, and had applied to the Commissioners for the Exhibition of 1851, for a grant of portion of the land at South Kensington as a site for the Exhibition of 1862, and were endeavouring to secure, in addition, such an appropriation of the land as would secure it for future Exhibitions. The Council have now to record that their communication with the proposed Trustees has ended in their acceptance of the duties which they were invited to undertake; that the Commissioners for the Exhibition of 1851 have granted a site for the Exhibition of 1862, rent free, and have, on certain conditions undertaken to reserve the land for an Exhibition to be held in the year 1872.

The Commissioners have also undertaken to grant to the Society of Arts a lease for 99 years, from January, 1863, of a portion of the Exhibition building, covering a site not exceeding one acre, in the event of the Exhibition being sufficiently successful to allow of such building being permanent, the rent to be paid being at the rate of £240 per acre; and the spot which has been selected as the site on which the Society of Arts' building is to be erected is the central portion of the ground fronting Cromwell-road, and consists of about three-quarters of an acre. The Council had a lengthened correspondence with the proposed Trustees previous to their acceptance of the trusts, and it was not until they had given the

most mature and careful consideration to the subject in all its aspects that they consented to undertake the arduous and responsible duties which the Society and the Guarantors had invited them to assume, and the Council may congratulate the members on having so efficient and influential a body to carry out the International Exhibition of 1862. As soon as the arrangements in reference to the site were complete and the Trustees had accepted the trusts, it became the duty of the Council to obtain such a recognition of the undertaking by the Crown as should give to it a great public national character, and should place the Trustees who were to conduct it in a position of authority, as well with regard to foreign Exhibitors as to those of our own country. With this view, the Society sought for and obtained from the Crown a Royal Charter, based upon the arrangements which had been settled by the Society, and which has incorporated the Trustees under the title of "The Commissioners for the Exhibition of 1862." This Charter has been given at length in the *Journal.** Before, however, the Commissioners could enter publicly on their duties, there remained for the Society the important charge of embodying the obligations of the guarantors in a legal document, upon which the necessary funds could be raised. Whilst the form of the Charter was being settled, a negociation was carried on with the Bank of England for the loan of £250,000 on the security of the guarantors, and a form of guarantee deed was settled, to which the signatures of 1,002 guarantors have been affixed, for sums in the aggregate amounting to £420,900, and on the security of this document the Bank of England has agreed to advance a quarter of a million of money to the Commissioners for the purposes of the Exhibition. The Commissioners are now, and for some time past, as is well known, have been actively engaged in organising and carrying out the Exhibition, and the members will be glad to be assured that, up to the present moment, everything is prospering as well as can be wished, and that on all sides, both at home and abroad, the Commissioners receive assurances of aid, such as render their labours certain of success. The Council cannot take leave of this subject without expressing to the members how deeply they are indebted to His Royal Highness the President for the valuable aid which His Royal Highness has afforded the Society. His Royal Highness, throughout the whole of the proceedings which have taken place, has not only taken a deep interest in them, but has been at all times ready to give his counsel and advice whenever sought; and the Council feel deeply grateful to their President for the valuable assistance that has been afforded whenever the influence of His Royal Highness's exalted position was needed, and his counsel and advice asked, and these occasions were not unfrequent. Of the deep interest which His Royal Highness takes in the Exhibition, the members have had the opportunity of judging for themselves, when he presided at the meeting on the 5th of June, on the occasion of the reading of an interesting paper, by Mr. Hawes, on the Exhibition of 1862.

* See present Vol., p. 205.

ROYAL ACADEMY OF MUSIC.

In compliance with a request from the Directors of the Royal Academy of Music, the Council have appointed a Committee to consider, in conjunction with that body, what measures should be taken to place that Academy in a position to realize the hopes of its founders, by subserving the purposes of a National School of Music. The subject is still under consideration.

MARINE ALGÆ.

Two Essays only were sent in competition for Sir Walter Trevelyan's Prize; one of the Essays, whilst they were under the consideration of the adjudicators, was withdrawn, and no prize has been adjudged to the other.

CONVERSAZIONI.

There have been two Conversazioni during the Session; one held in the Society's House in the Adelphi, and the other at the South Kensington Museum; at the latter upwards of 5,500 persons were present.

EXHIBITION OF INVENTIONS.

The Society's Thirteenth Annual Exhibition of Inventions was held in the Society's Rooms as usual. The particulars have already appeared in the Society's *Journal.*

MEDALS.

The Papers read during the Session have been of an interesting character, and the following have been selected by the Council for the award of Medals and of Special Thanks:—

To Dr. Edward Smith, F.R.S., for his two papers, "Recent Experimental Inquiries into the Nature and Action of Alcohols as Food," and "On the Uses of Tea in the Healthy System." *The Society's Silver Medal.*

To A. K. Isbister, for his paper "On the Hudson's Bay Territories; their Trade, Productions, and Resources; with Suggestions for the Establishment and Economical Administration of a Crown Colony on the Red River and Saskatchewan." *The Society's Silver Medal.*

To Alexander Redgrave, for his paper "On the Progress of the Textile Manufactures of Great Britain." *The Society's Silver Medal.*

To Dr. Milligan, for his paper "On Tasmania; its Character, Products, and Resources." *The Society's Silver Medal.*

To Charles Ledger, for "The Introduction of the Alpaca into the Australian Colonies." *The Society's Silver Medal.*

To F. Joubert, for "The Application of Photography to the production of Images on Glass, which can be burnt in." *The Society's Silver Medal.*

To A. J. Tansley, for his paper "On the Straw Plait Trade." *The Special Thanks of the Society.*

To Charles Tomlinson, for his paper "On the Economic History of Paraffine. *The Special Thanks of the Society.*

Union of Institutions.

As regards this branch of the Society's business, the Council refer for particulars to the Report of the Secretary, read to the Conference on the 18th instant. The Union continues to flourish. The Examinations have been held, with increased success, at eighty-one different places in England and Wales, Scotland and Ireland; and the Society may have the gratification of knowing that it has not only accomplished considerable results by its own immediate action, but has also brought into existence nearly one hundred Local Boards of Education, whose operations are constantly increasing in extent and value.

Finances.

In conclusion, the Council have great pleasure in referring to the very satisfactory position of the Society in a financial point of view, a large and unprecedented number of members having joined the Society during this Session. 556 new Members, including those who will be elected at the close of this meeting, have been added to the Society's list, and the balance sheet which, in accordance with the Bye-laws, was published in last week's *Journal*, shows the increasing prosperous condition of the Society.

The Chairman then put to the Meeting that the report now read be received and adopted, which was carried unanimously.

Mr. J. Griffith Frith moved a vote of thanks to Sir Thomas Phillips, for the able manner in which he had conducted the business of the Society, as Chairman of the Council during the past Session. The remarkable zeal and intelligence which he had exhibited during the past year of office, when the duties had been more than usually onerous, could not but entitle him to the gratitude of the members, and he was sure they would join with him (Mr. Frith) in expressing their appreciation of his valuable services, particularly in relation to the approaching Great Exhibition.

Mr. Fred. Lawrence, in seconding the motion, could not but feel that the Chairman and the rest of the Council deserved special thanks for all they had done for the Society during the past session. The duties in connection with the Exhibition had been unusually arduous, and there had been a good deal of up-hill work in overcoming various difficulties. Now that its success had ceased to be doubtful every one was ready to come forward and support it, but this had not been the case in the first instance, and had it not been for what Sir Thomas Phillips had recently so well described as the "aggressive" policy of the Society, the undertaking would not have been placed in its present favourable position. With regard to the Society of Arts, he thought it had scarcely been sufficiently selfish in this matter; it was not well treated in 1851, and he much feared it would derive little benefit, except in the shape of credit, from the approaching Exhibition. With reference to the arrangements with the Commissioners for the Exhibition of 1851, as to the site for the building, and other matters, he thought they had made a very good bargain for themselves, and that the Society would not derive much advantage. With regard to the Guarantee Fund, he thought that as the Guarantors were to decide on the appropriation of the surplus, the list ought soon to be closed, or there would be danger that those who came in at the eleventh hour, when the risk was almost nominal, might swamp by their votes the members of the Society, who had come forward at an early stage to support the Exhibition.

The Chairman in putting the motion to the meeting, desired, as a member of Council, to bear his testimony to the remarkable manner in which Sir Thomas Phillips had devoted his energies and time to the work of the Society. His professional knowledge had also been most valuable in the recent negotiations connected with the Exhibition. With regard to the remarks of Mr. Lawrence as to the Guarantee List, he was disposed to a great extent to agree with him, but it must be allowed that there were great difficulties as to closing the list, for if, in spite of all expectation, any deficit were to occur, the Guarantors might feel disposed to blame the Council for refusing to receive additional names, by which, of course, the individual loss would have been diminished.

The vote of thanks to Sir Thomas Phillips was carried unanimously.

The ballot having remained open one hour, and the scrutineers having reported, the Chairman declared that the following members had been unanimously elected to fill the several offices. The names in *italics* are those of members who have not, during the past year, filled the offices to which they have been elected:—

COUNCIL.

PRESIDENT.

His Royal Highness the Prince Consort, K.G.

VICE-PRESIDENTS.

Thomas Dyke Acland.	The Earl Granville, K.G., F.R.S.
Lord Ashburton, F.R.S.	*William Hawes.*
Sir Richard Bethell, M.P.	Henry Thomas Hope.
W. H. Bodkin.	Sir Thomas Phillips, F.G.S.
Sir John P. Boileau, Bart.	The Marquis of Salisbury, K.G.
The Duke of Buccleuch, K.G.	Lord Stanley, M.P.
Harry Chester.	William Tooke, F.R.S.
Henry Cole, C.B.	Thomas Winkworth.
C. Wentworth Dilke.	Vice-Chancellor Sir William Page Wood, V.P.R.S.
John Dillon.	
William Fairbairn, LL.D., F.R.S.	

OTHER MEMBERS OF COUNCIL.

John Bell.	J. C. Macdonald.
J. Griffith Frith.	William Thomas Mackrell.
Peter Graham.	M. H. Marsh, M.P.
Edward Hamilton.	*Lestock Robert Reid.*
Robert Hunt, F.R.S.	Thomas Sopwith, F.R.S.
Francis Le Breton.	Wm. Spottiswoode, F.R.S.

TREASURERS.

Samuel Redgrave. | *George F. Wilson, F.R.S.*

AUDITORS.

John Alger. | *W. B. Simpson.*

SECRETARY.

Peter Le Neve Foster, M.A.

FINANCIAL OFFICER.

Samuel Thomas Davenport.

At the conclusion of the General Meeting, a Special Meeting, called for the election of members, was held, at which William Hawes, Esq., Member of the Council, presided.

The following candidates were balloted for and duly elected members of the Society :—

Addington, Right Hon. Henry Unwin	78, Eaton-place, S.W.
Allen, Edward Ellis	2, Brunswick-place, Brompton, S.W.
Andrew, Charles William	6, Spencer-place, Brixton-road, S.
Andrews, Samuel	21, John-street, Adelphi, W.C.
Angell, Joseph	10, Strand, W.C.
Asprey, Charles	166, New Bond-street, W., and 22, Albemarle-street, W.
Bashford, Frederick	43, Porchester-square, Hyde-park, W.
Batty, George	11, Pavement, Finsbury, E.C.
Baume, Celestin	21, Hatton-garden, E.C.; and 15, Canterbury-road, East Brixton, S.
Beckwith, Edward Lonsdale	Bartholomew-close, E.C.
Berri, David Gardner	96, Great Russell-street, Bloomsbury, W.C.
Bevan, William	24, Porchester-square, W.
Beveridge, Erskine	Priory House, Dunfermline, N.B.
Biddle, Daniel	81, Oxford-street, W.
Bird, George	38, Edgware-road, W.
Black, Alexander	31, Hyde-park-gardens, W.
Black, J. R., M.D.	23, Sumner-place, Onslow-square, S.W.
Blackwell, Thomas F.	21, Soho-square, W.
Bradley, James	47, Pall-mall, S.W.
Brice, Alexander	Malabar-lodge, Lee, Kent.
Brook, Charles, Jun.	Meltham-mills, near Huddersfield.
Browning, John	111, Minories, E.
Butter, Henry	4, Minerva-place, Barnsbury-park, N.
Byas, Edward	20, Princes-square, Bayswater, W.
Cama, M. H.	21, Gresham-house, City, E.C.
Christie, William	1, Sussex-terrace, King's-road, Chelsea, S.W.
Christy, Henry	103, Victoria-street, Westminster, S.W.
Cock, John, jun.	Southmolton, Devon.
Coghlan, H.	14, Hyde-park-gardens, W.
Cole, Thomas	6, Castle-street, Holborn, E.C.
Collins, William Job, M.D.	1, Albert-terrace, Primrose-hill, N.W.
Cooke, William	26, Spring-gardens, S.W.
Cousens, Richard Thos.	4, Kensington-palace-gardens, W.
Cremer, William Henry	27, New Bond-street, W.
Davis, Frederick	100, New Bond-street, W.
Derham, James	Nelson-street, Bristol.
Derham, Samuel	Nelson-street, Bristol.
Devonshire, Duke of, K.G., F.R.S.	78, Piccadilly, W.
Drew, John	4, Christopher-street, Hatton-garden, E.C.
Eavestaff, W. G.	60, Great Russell-street, Bloomsbury, W.C.
Edwards, Morton	5, George-street, Hanover-square, W.
Evans, John Llewellyn	120, Westbourne-terrace, W.
Fairbairn, Andrew	Wellington Foundry, Leeds.
Faulkner, David	3, Brydges-street, Strand, W.C.
Fisher, Samuel	33, Southampton-street, Strand, W.C.
Foote, Harry Wells	75, Old Broad-street, E.C.
Foster, Charles Finch	Cambridge.
Frodsham, Geo. Henry	31, Gracechurch-street, E.C.
Galen, Alexander, M.A.	8, Percy-circus, Pentonville, W.C.
Galpin, Thomas Dixon	Datchet Lodge, Datchet.
Gibbs, John	122, High-street, Oxford.
Glubb, Albert Charles Lyne	Liskeard, Cornwall.
Gooden, James Chisholm	33, Tavistock-square, W.C.
Goore, Wm. Henry P.	Camden-villa, Moscow-road, Kensington Palace-gardens, W.
Grabham, Charles	18, Cannon-street, E.C.
Great-Rex, Augustus	23, Holborn-hill, E.C.
Hannay, Thomas	7, Terrace, Liskeard, Cornwall.
Harriott, George R.	86, St. James's-street, Pall-mall, S.W.
Hawkins, George	88, Bishopsgate-street Without, E.C.
Hemming, Frederick H.	104, Gloucester-place, Portman-square, W.
Henderson, George Wm. Mercer	103, Eaton-place, S.W.
Hewett, William	18, Fenchurch-street, E.C.
Hindley, Samuel	12, Friday-street, Cheapside, E.C.
Holden, Isaac	Dockroyd, Yorkshire.
Hopcraft, George	3, Billiter-square, E.C.
Howard, William	Bath Hotel, Piccadilly, W.
Hunt, Edmund	28, St. Enoch-square, Glasgow.
Hurwitz, B.	9, Southampton-street, Strand, W.C.
Johnson, F.	12, North-street, Westminster, S.W.
Johnson, John Morris	3, Castle-street, Holborn, E.C.
Kinnaird, Lord	50, Avenue-road, St. John's-wood, N.W.
Knill, Stuart	The Crosslets-in-the-grove, Blackheath, S.E.
Ledger, Robt. Goulding	St. John's, Southwark, S.E.
Leigh, Evan	Newton-grange, Newton Heath, near Manchester.
Leigh, Frederick Allen.	Eccles, near Manchester.
Leonard, Thomas	Tabernacle-walk, Finsbury, E.C.
Leuchars, William	38, Piccadilly, W.
Lewis, James	Bartlett's-buildings, Holborn, E.C.
Lezard, Joseph	21, Hatton-garden, E.C.; and 41, Duncan-terrace, Islington, N.
Line, William	Daventry.
Loader, Richard	23 and 24, Pavement Finsbury, E.C.
Longford, Earl of	24, Bruton-street, W.
Lucas, Thomas Charles.	Lower Grove House, Roehampton, S.W.
Lyons, George	Woodlands, near Aylesbury.
Macarthur, Major-Gen. Edward, C.B.	133, Piccadilly, W.
MacConnell, James, C.E.	Wolverton.
Malcolm, Major-General G. A.	67, Sloane-street, S.W.
Martyn, Silas Edward	46, Thurloe-square, Brompton, S.W.
Maynard, Joseph	52, Westbourne-terrace, W.
Metchim, W. P.	Stamford-house, Upper Park-road, Haverstock-hill, N.W.
Miles, Alfred W.	11, St. Mary Abbot's-terrace, Kensington, W.
Monk, Frederick W.	7, Albion-terrace, Faversham.
Moule, John	15, Seabright-place West, Hackney-road, N.E.
Needham, William	Kilmorey House, St. Margaret's, Twickenham, S.W.
Nelson, Marsh	150, Piccadilly, W.
Newen, George	1, Hyde-park-terrace, Kensington-gore, W.
Noland, Edward Henry	29, Abingdon-villas, Kensington, W.

Northcote, Stafford Henry	29, St. Paul's-churchyard, E.C.
Palmer, W. H.	22, Hyde-park-gate South, Kensington, W.
Pearce, John	2, Cockspur-street, Charing-cross, S.W.
Pender, John	Manchester.
Petter, George William	7, Upper Hornsey-rise, N.
Phillips, George	358 and 359, Oxford-street, W.
Reed, Charles	Paternoster-row, E.C.
Richardson, Thomas	Linen Hall, Dublin.
Rintoul, Robert	Wyndham Club, St. James's-square, S.W.
Robertson, John Forbes	Mountfort House, Barnsbury-square, N.
Rothschild, Baron Lionel N. de, M.P.	New-court, St. Swithin's-lane, E.C.; Kingston-house, Prince's-gate, S.W.; and Gunnersbury-park, Ealing, W.
Sassoon, S. D.	17, Cumberland-terrace, Regent's-park, N.W.
Saul, G. T.	Bow Lodge, Bow, E.
Seaman, W. M.	199, Sloane-street, S.W.
Shove, W. Spencer	Lee-terrace, Lee, S.E.
Smith, George	27, Norfolk-crescent, Hyde-park, W.
Stanhope, Earl	3, Grosvenor-place-houses, S.W.
Staples, Joseph	10, South-street, Brompton, S.W.
Staples, Joseph Henry Prosser	25, Upper Seymour-street West, Connaught-square, W.
St. John, Horace Roscoe	Crown-hill, Upper Norwood, S.
Story, George Marvin	2, Coleman-street, E.C.
Strange, F.	Tower-hill House, Anerley-road, Upper Norwood, S.
Talbot de Malahide, Lord	Athenæum Club, Pall-mall, S.W.; and 81, Jermyn-street, S.W.
Tayler, George	4, Gower-street, Bedford-square, W.C.
Teulon, Seymour	Tenchley-park, Limpsfield, Surrey.
Thorneycroft, Capt.	Tettenhall-wood, Wolverhampton.
Towle, John	Weirs and Hincksey Mills, near Oxford.
Tuckett, C., Junr.	British Museum, W.C.
Tuely, Nathaniel, C.	8, Spencer-villas, Southfields, Wandsworth, S.W.
Waite, George	2, Old Burlington-street, W.
Walker, Joseph W.	27, Francis-street, Tottenham Court-road, W.C.
Webb, Thomas	37, Bedford-place, Russell-sq., W.C.
Williams, Charles	223, Oxford-street, W.
Woodall, Frederick	25, Orchard-street, Portman-square, W.
Yates, William, Jun.	31, Parliament-street, S.W.

As a Corresponding Member.

Dr. Dino Carina	Pisa, Tuscany.

To Correspondents.

Erratum.—In the last number of the *Journal*, p. 567, col. 1, lines 56 and 57, for "Mr. Adams (Secretary of the Shrewsbury Local Board)," read "Mr. Edwin Adams (Secretary of the Chelmsford Local Board)."

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Royal Inst., 2. General Monthly Meeting.
Entomological, 8.
Fri. ......Archæological Inst., 4.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, June 21st*, 1861.]

Dated 15th February, 1861.

388. M. Brown-Westhead, Manchester—Imp. applicable to the government or regulation and registration of excessive speed in hoisting apparatus, and railway carriages.

Dated 23rd February, 1861.

470. T. Spencer, Eccleston, near Prescot, Lancashire—Imp. in apparatus for the manufacture of articles of earthenware and of other plastic materials.

Dated 6th April, 1861.

854. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in looms for weaving figured fabrics, and in apparatus connected therewith. (A com.)

Dated 17th April, 1861.

940. H. Anthonissen, Brussels—An improved method of making bread and obtaining starch from the materials employed simultaneously.

Dated 22nd April, 1861.

995. H. Tarbouriech, Paris, 42, Laffitte-street—A double system mixed press.

Dated 23rd April, 1861.

1012. M. Henry, 84, Fleet-street—Imp. in apparatus for aerating liquids. (A com.)

Dated 6th May, 1861.

1136. E. L. Paraire, 52, Rathbone-place—Imp. in apparatus for propelling carriages on common roads.

Dated 16th May, 1861.

1246. F. N. Gisborne, 3, Adelaide-place, London-bridge—Imp. in the construction of electric targets for rifle and gun practice.

Dated 23rd May, 1861.

1308. W. Tebbutt, Loughborough, Leicestershire—Imp in apparatus for ventilating dwelling rooms and other places, and for removing foul or noxious air therefrom.

1310. R. Mushet, Coleford, Gloucestershire—An imp. or imps. in casting ingots of steel.

Dated 24th May, 1861.

1316. F. H. Danchell, Red Lion-square—Certain improved methods of, and apparatus for, ascertaining and removing impurities contained in water.

Dated 27th May, 1861.

1334. G. H. Birkbeck, 34, Southampton-buildings, Chancery-lane—Imp. in apparatus for converting circular or rotary motion into alternate rectilinear motion. (A com.)

Dated 29th May, 1861.

1342. J. Halliwell, Baslow, Derbyshire—Imp. in churns.

Dated 30th May, 1861.

1354. A. Oudry, Paris—An improved construction of suspension bridges.

Dated 31st May, 1861.

1367. R. Laming, Priory-road, Kilburn—Imp. in manufacturing alkaline carbonates. (A com.)

Dated 1st June, 1861.

1378. F. N. Gisborne, 3, Adelaide-place, London-bridge—Imp. in the means of, and apparatus for, indicating the course to be steered in ships at sea and in galvanic batteries to be used in some cases therewith.

Dated 4th June, 1861.

1394. H. Allman, 13, Bedford-row—Certain imp. in the construction of window sash fasteners.

1396. H. H. Hazard, Nelson-terrace, City-road—Imp. in cartridges.

1397. A. Prince, 4, Trafalgar-square—Imp. in the manufacture of gas and in the apparatus connected therewith. (A com.)

Dated 5th June, 1861.

1413. A. Duguet, 15, Newman-street, Middlesex—An imp. in the manufacture of pianos. (A com.)

1415. F. J. Manceaux, Paris—Imp. in breech-loading arms, and in projectiles for breech-loading arms.

Dated 6th June, 1861.

1417. J. Baker, 315, Oxford-street—The more perfectly finishing off and closing loaded cartridge cases used in breech-loading sporting guns.

1418. D. Nickols, Manchester—Imp. in machinery or apparatus for cutting paper or other materials.

1419. J. Bailey and W. H. Bailey, Albion Works, Salford—Imp. in apparatus for indicating the speed, flow, pressure, and vacuum of liquids, fluids, and other bodies.

1420. H. T. Coles, Silchester, Hants—Imp. in mechanism or apparatus for locks and bolts and other fasteners, gun locks, and gun breeches, catches for weaving shuttles, double screws, rifles, pistols, other fire-arms and ordnance, weaving-traversers, winders, sewing, weaving, netting, and other machines, and self-acting claws and grapplers.

1421. L. J. Pomme de Mirimonde, Paris—Imp. in axle boxes, and in lubricating the parts therein.

1423. S. Moore, Liverpool—Imp. in apparatus or machinery for dressing and polishing rice.
1424. H. Rigby and P. W. Lowe, Salford—Imp. in the construction of steam boilers, and in the arrangement of the flues of steam boilers.
1425. C. Stratford, 1, Grooms Hill Grove, Greenwich, Kent—An equilibrium steering apparatus.
1426. G. Baker, Birmingham—A new or improved instrument or apparatus for churning and for beating eggs, and for other like purposes.
1427. T. Hamilton and J. Hamilton, Glasgow—Imp. relating to cop tubes.
1429. H. Turner and T. Yates, Leicester—Imp. in the manufacture of elastic web.
1430. S. Hawkins, 2, John-street, Kingsland-road—Imp. in expanding tables.
1431. H. Turner and T. Yates, Leicester—Imp. in railway signals.
1432. W. O. Johnston, Newcastle-upon-Tyne—Imp. in pillars for supporting the roof in coal and other mines.
1433. B. D. Godfrey, Milford, U.S.—An improved boot or shoe with leather "uppers" and india-rubber" soles.
1435. E. Hewett, St. Leonards-on-Sea, Sussex—Imp. in apparatus for creating or increasing air draughts in flues or other channels for ventilation and other purposes.
1437. J. Platt and W. Richardson, Oldham—Imp. in machinery or apparatus for making bricks.
1438. W. E. Newton, 66, Chancery-lane—Imp. applicable to railways for the purpose of facilitating the transport of carriages containing goods and passengers across arms of the sea, rivers, lakes, or inland waters. (A com.)
1439. J. Platt and W. Richardson, Oldham—Imp. in machinery or apparatus, commonly called "gins," for cleaning cotton from seeds.

Dated 7th June, 1861.

1441. J. Vaughan, Middlesborough-on-Tees—Imp. in the manufacture of railway sleepers.
1442. R. Harlow, Heaton Norris, Lancashire—Imp. in the fire bridges and tubes of steam boilers, and in the manner of applying the same.
1443. H. A. Balsac, Paris—An improved electro-thermometrical alarum.
1444. J. Leeland, Birmingham—An imp. or imps. in the sacking of bedsteads or couches and other articles used for sitting, lying, or reclining upon.
1445. H. De Simencourt, Corbyn's Hall, near Dudley, Worcestershire, and J. K. Blackwell, 73, Gloucester-terrace, Hyde-park—Imp. in reverberatory and other furnaces.
1446. S. Bennett, jun., Handsworth, Staffordshire—An imp. or imps. in utilizing waste or defective pieces of tubing made of iron or of other metal or metallic alloy.
1447. W. Wood, Shibden, near Halifax, Yorkshire—Imp. in looms for weaving.
1448. A. A. Croll, Coleman-street—Imp. in the manufacture of sulphate of alumina.
1449. E. A. Cowper, Great George-street, Westminster—Imp. in protecting ships of war and land batteries from the effects of projectiles.
1450. W. Leopard, Hurstpierpoint, Sussex—Imp. in railway brakes.
1451. R. L. Cole, Minerva-place, Kennington-road—An improved manufacture of glove for currying horses and other cattle.
1452. C. W. Lancaster, New Bond-street—An improved method of sheathing ships and vessels with copper and other metallic sheathing.
1453. J. F. Clarke, 26, Moorgate-street—Imp. in apparatus for regulating the supply of fluids.

Dated 8th June, 1861.

1455. J. Whines, Pimlico—Imp. in double action box spring hinges for swing doors.
1456. W. Robertson, Manchester—Imp. in the manufacture of drawing and delivering rollers used in preparing and spinning fibrous materials.
1458. J. M. Worrall and T. Lawrence, Ordsall, Lancashire—Certain imp. in machinery or apparatus for bruising, raising, and dressing the surfaces of cut-pile and looped fabrics.
1459. R. M. Latham, 71, Fleet-street—An imp. in hooped or hoop skirts. (A com.)
1460. J. Mason, Nottingham—A woollen article as a substitute for a sponge.
1461. J. Howard and E. T. Bousfield, Bedford—Imp. in haymaking machines.
1463. P. O'Hanlon, Kingston-upon-Hull—Imp. in marine and land steam boilers.
1464. J. Martin, Myrtle Hall, Sidmouth—An improved ironing stove.
1465. J. Rymer, 33, Avenue-road, Regent's-park—Imp. in the permanent way of railways.
1466. J. Hutchinson, Appleton-lodge, Widnes, near Warrington, Lancashire—Imp. in the treatment of wool.
1467. J. McKay, Glasgow—Imp. in apparatus or means for cleaning chimneys or flues.
1468. W. Clark, 53, Chancery-lane—Imp. in the manufacture of a material or composition for cleaning and polishing metals and glass. (A com.)
1469. W. Clark, 53, Chancery-lane—Imp. in constructing casks tubs, and other like vessels, whereby to render them water-tight. (A com.)

Dated 10th June, 1861.

1470. J. Whitehead, David-street, Manchester—Certain imp. in looms for weaving.
1471. A. L. C. de Montagu, 4, South-street, Finsbury—A cone preventing smoke and extinguishing fires in chimneys.
1473. A. Brown, Waterloo-road, Liverpool—Imp. in obtaining fresh water at sea by means of distilling apparatus combined with the cooking stoves or otherwise.
1474. D. Rollo, Liverpool—Imp. in valves for steam and other engines.
1475. W. Weller, Mile-end—Improved apparatus for supplying fuel to furnaces, preventing or consuming smoke, and economizing fuel.
1476. J. Oldroyd, Dewsbury, Yorkshire—Imp. in combining or mixing various colours of wool or other fibrous substances in the preparations of yarns for textile fabrics.
1477. M. Mason, Manchester—Imp. in flyers and spindles of machinery for preparing, spinning, and doubling fibrous substances.
1478. W. Crofts, Lenton-terrace, Park-side, Nottingham—Imp. in means or apparatus employed in the manufacture of fabrics by lace machinery.
1479. C. F. Whitworth, Moses-gate, near Bolton, Lancashire—Imp. in means or apparatus employed in signalling on railways.
1480. J. Langdale, jun., South Stockton-on-Tees—An improved washing machine.
1481. J. Steart, 5, St. James'-road, Blue Anchor-road, Bermondsey—Imp. in treating skins for the manufacture of leather.
1482. M. Hawdon, Blaydon, Durham—Imp. in apparatus for constructing moulds for casting metals.
1483. R. Romaine, Devizes, Wiltshire—Imp. in machinery applicable to steam cultivation.
1485. J. B. Carter, Wilford-road, Nottingham—Imp. in apparatus used in dressing lace or other fabrics.
1486. M. Henry, 84, Fleet-street—Imp. in fire-arms. (A com.)

Dated 11th June, 1861.

1487. F. E. Schneider, 13, Rue Gaillon, Paris—Imp. in breech-loading fire-arms.
1488. C. Stevens, 31, Charing-cross—An improved crushing and pulverizing machine. (A com.)
1489. C. Stevens, 31, Charing-cross—An improved impermeable varnish for leather. (A com.)
1491. P. M. Crane, Irish Peat Works, Athy, Ireland—Imp. in the manufacture of peat fuel.

Inventions with Complete Specifications Filed.

1393. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Imp. in th construction of miniature microscopes and in the arrange ment of the objects used therewith. (A com.)—4th June 1861.
1530. A. F. Johnson, Boston, U.S.—Certain new and useful imps. in machinery for sewing cloth or other material.—14th June, 1861.

Patents Sealed.

[*From Gazette, June 21st*, 1861.]

June 21st.
3161. F. Puls.
3168. W. Parry.
3172. W. Hill and H. Barber.
3185. J. Brinton and J. Lewis.
3187. F. R. Burnham.
4. M. Henry.
46. W. Rattray.
52. D. Adamson.
57. C. S. Dawson.
112. C. Stevens.
144. W. E. Newton.
202. S. Needham.
212. J. H. Johnson.
217. J. Clark.
224. W. E. Newton.
452. R. Cuthbert and W. Cuthbert.
822. W. E. Newton.
926. F. Lennard.
950. H. Jones.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, June 21st*, 1861.]

June 17th.
1381. P. B. E. Martin.
June 18th.
1383. S. Hewitt.
1402. W. E. Newton.
1438. J. Taylor.
1485. F. Richmond and H. Chandler.
June 19th.
1420. Sir J. Paxton, Knt., M.P.
1422. W. E. Newton.

[*From Gazette, June 25th*, 1861.]

June 20th.
1400. W. E. Newton.
1486. E. Lord.
June 22nd.
1415. T. Spencer.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, June 21st*, 1861.]

June 15th.
1347. N. Clayton and J. Shuttleworth.
1359. O. R. Chace.

[*From Gazette, June 25th*, 1861.]

June 20th.
356. J. M'Innis.
June 21st.
1401. R. Bottomley, D. Schofield, and H. Spencer.

Journal of the Society of Arts.

FRIDAY, JULY 5, 1861.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £422,800, have been attached to the Deed.

GUARANTEE FUND FOR THE EXHIBITION OF 1862.

The following additions have been made since the announcement in the *Journal* for June 14 :—

*** *The names marked with an asterisk are those of Members of the Society of Arts.*

NAMES.	AMOUNT.	REPRESENTING THE OBJECTS OF THE SOCIETY—ARTS, MANUFACTURES, AND COMMERCE.
*George Lowe, F.R.S., 39, Finsbury-circus, E.C.	£200	Arts.
F. R. de la Trehonnais, Oak-villa, Norwood, S.	100	Arts.
*William Baker, 30, Cranbourn-street, W.C....	100	Commerce.
*Richard Greaves, The Cliff, Warwick	100	Arts.
Horace St. John, Hope House, Norwood, S.	100	Arts.
*Joseph Goff, jun., 25, Grosvenor-place, S.W.	100	Arts.
Richard Birley, Seedley, Pendleton, Manchester	500	Commerce.
Samuel H. Thompson, Thingwall, Liverpool	500	Commerce.
W. N. Hodgson, Newby Grange, Carlisle	250	Arts.
Lt.-Col. H. D. Maclean, Lazonby Hall, Penrith	250	Arts.
Richard Moon, Bevere, near Worcester	250	Arts.
Charles E. Stewart, 30, Upper Harley-street, W.	250	Commerce.
H. Wollaston Blake, 8, Devonshire-place, W.	100	Commerce.
W. S. Marshall, 20, Strand, W.C.	1,000	Commerce.
John Girdwood, 49, Pall-mall, S.W.	100	Arts.
*Thomas Hilton, Great Suffolk-street, Southwark, S.	100	Commerce.
*Seymour Teulon, Tenchley's-park, Limpsfield, Surrey	100	Arts.
Charles Woolloton, 246, High-street, Borough, S.	500	Commerce.

By Order, P. LE NEVE FOSTER, *Secretary.*

INTERNATIONAL EXHIBITION OF 1862.

Her Majesty's Commissioners have appointed the following Committees, in addition to those already published in the *Journal* :—

For Class 2 (Chemical Substances and Products), W. T. Brande, Esq., F.R.S.; Warren de la Rue, Esq., F.R.S.; Professor Faraday, F.R.S.; Thomas Graham, Esq., F.R.S.; A. W. Hofmann, Esq., LL.D., F.R.S.; W. A. Miller, Esq., M.D. F.R.S.; Dr. Lyon Playfair, C.B., F.R.S.; Theo. Redwood, Esq., Ph.D.; J. Stenhouse, Esq., LL.D., F.R.S.

For Sanitary Appliances, in connection with Class 10 (Civil Engineering, Architectural Machines, and Building Contrivances), the Earl of Shaftesbury; Viscount Ebrington; the Right Rev. the Lord Bishop of Bath and Wells; the Right Hon. the Lord Mayor; Sir Morton Peto, Bart., M.P.; John Campbell, Esq.; E. Chadwick, Esq., C.B.; W. Fairbairn, Esq., LL.D., F.R.S.; Captain D. Galton, R.E.; G. Godwin, Esq., F.R.S., F.S.A.; Philip Holland, Esq.; Owen Jones, Esq.; Dr. Letheby; J. Simon, Esq., F.R.S.; R. Rawlinson, Esq., C.E.; A. Strutt, Esq.; Dr. Sutherland, F.R.S.; T. Twining, jun., Esq.

The following Local Committees have been formed, in addition to those already published :—

DUMFRIES.

James Gordon, Esq. (Provost), *Chairman.*

W. R. M'Diarmid, Esq. (of the *Dumfries and Galloway Courier*), *Vice-Chairman.*

Wm. Martin, Esq. (Town Clerk), *Hon. Secretary.*

LEAMINGTON.

Messrs. Bowen and Stanley (of the Local Board of Health), to act as a Local Committee.

LEICESTER.

Joseph Whetstone, Esq., *Chairman.*
John D. Harris, Esq., *Vice-Chairman.*
J. A. Wykes, Esq., *Secretary.*

Meetings of the Metropolitan Exhibitors have taken place, and Class Committees for the Metropolis, in addition to those already published, have been appointed as follows :—

Class 2 (Chemical Substances, &c.)

Sub-class A (Exhibitors of Chemical Products): Messrs. Henry Cox, Heywood, and Samuel Lloyd Howard.

Sub-class B (Exhibitors of Medical and Pharmaceutical Processes): Messrs. Bastick, C. Davy, Daniel Hanbury, and S. Piesse.

Class 13 (Philosophical Instruments, &c.): Messrs. Elliott, F. H. Holmes, W. Ladd, H. Lealand, W. Simms, B. Stewart, and C. Varley.

Class 21 (Woollen and Worsted, &c.): Messrs. Beecham, J. P. Bull, F. Scott, H. S. Way, and J. West.

Class 22 (Carpets): Messrs. Baber, H. Lapworth, T. Smith, Tapling, and Edgar Waugh.

Class 25 (Skins, Fur, Feathers, and Hair): Sub-Class A., Messrs. Drake, Ince, Jeffs, Poland, and Mr. Bevington, *Chairman.*

Sub-Class B. (Feathers): Messrs. Barrett, Child, Farrant, Hovenden, Truefitt, Winter, and Mr. Nightingale, *Chairman.* [This Committee acts for Sub-Classes B. and C. conjointly.]

Class 27 (Articles of Clothing).

Sub-class A (Hats and Caps): Messrs. Ellwood, Tress, and C. Gaimes, *Chairman.*

Sub-class C (Hosiery, Gloves, and Clothing in general):

Messrs. Blyth, Foster, Fownes, Harborough, Meyers, Salomons, and Thompson.

Sub-class D (Boots and Shoes): Messrs. Atloff, Bowley, Dutton, Gordon, Hook, Humby, Medwin, Norman, and Peel.

Class 35 (Pottery): Messrs. J. Battam, Alderman Copeland, A. R. Daniell, H. Doulton, and W. J. Goode, Jun.

The following is the translation of a letter, addressed to Lord Granville, and received by Her Majesty's Commissioners:—

Berlin, 18th June, 1861.

My Lord,—I have the honour to acquaint your Lordship that I have undertaken the direction of a Commission, appointed to represent the interests of Prussian manufacturers at the Universal Exhibition of Art and Industry, to be held in London in the spring of next year, and to enter into correspondence with the Commissioners of her Majesty the Queen.

The idea of affording to the nations another opportunity of showing their industrial progress, seems to me very happy and opportune; and I conceive that there is every cause for gratitude to those who first conceived it, and have taken upon themselves the labour of carrying it into execution. The modifications of tariffs among European nations, which have lately been made, or may shortly be expected—modifications most important to trade, and the promotion of which confers the greatest honour upon Great Britain and her enlightened statesmen—will, no doubt, have great influence upon the exchange of goods, and materially add to the range of commerce. Under these circumstances, the Exhibition will assume the character of a great fair, calculated to create new commercial relations and to extend those that exist. Hence, apart from the advantage of instruction, it will afford considerable substantive advantages to those who take part in it, and will, doubtless on this account, find all men eager to participate. I am convinced that the Prussian manufacturers will appreciate the importance of the undertaking.

I beg to transmit to your lordship herewith the first document addressed by the Prussian Commission to the Commissioners for the Exhibition; and I avail myself of this opportunity to recommend it, and those which will follow it, to your favourable consideration and attention.

With especial esteem,

(Signed) FREDERIC WILLIAM,
Crown Prince of Prussia.

The following Foreign Commissions have been appointed, in addition to those already published:

Denmark Proper and Slesvig.

Professor Hummell, Technical Counsellor of the Ministry of the Interior; Mr. Thiele, Secretary of the Royal Academy of Fine Arts; Mr. Schwartz, jun., President of the Society of Arts and Industry.

Holstein and Lauenburg.

Professor Dr. Karsten; Mr. C. Jaspersen, manufacturer; Mr. F. A. Flach, President of the Agricultural Society; Mr. G. Martens, Architect.

Mr. A. Westenholz, 26, Mark-lane, City, will act as Agent and Commissioner for the two Commissions, through whom all communications are to be addressed.

THE MANSFELD COPPER-SLATE MINES IN PRUSSIAN SAXONY: THEIR PAST AND PRESENT STATE; WITH STATISTICS: METALLURGICAL PROCESSES, ADMINISTRATION, SOCIAL CONDITION OF THE MINERS, BENEVOLENT FUND.

By W. P. Jervis, F.G.S., Mining Engineer.

From whatever point of view we choose to regard them, the Mansfeld mines must decidedly rank among the most interesting in the world. Whether we look at the enormous amount of matter annually raised from the bowels of the earth, greater than that from any copper mine in this country, or the exceeding poverty of the ores, which would at first sight appear to be useless; the apparent anomaly that every ton of refined copper as it leaves the works has actually cost more than an equal weight of metal could be purchased for on the spot from the merchant, or the magnificent and simple process lately devised by a chemist of no low standing, by which a quantity of silver in it, scarcely perceptible on a small scale by the finest analysis, is made to yield the most dazzling results; whether we examine the beautiful arrangement of the Royal Mining Office in Eisleben, or study the economical working of the several departments of the company's administration; whether we expatiate upon the splendid success attendant on keeping elaborate and costly statistics, or look to the beneficial effects of having the officials scientifically and practically trained in a mining school; lastly, whether, diving more deeply into its social consequences, we admire the wisdom by which the miners are supplied with the staff of life at a fixed price, and provided with benevolent funds, pensions, &c., or carrying our eyes back for three centuries, pay a tribute of respect to the memory of the great man who may be said to have given the first impetus to these mines, long worked by a downtrodden people; however examined, the Mansfeld mines seem to deserve far more attention than has hitherto been bestowed on them. The wish of the writer is two-fold, not only to give a pleasant description to amuse, or an historical account to record past success, but to draw inferences whereby to improve the mode of working mines elsewhere; nor will he consider his task accomplished unless the same benevolent institutions long developed to such advantage in one place be brought to bear on the British mining population, for, although it would be untrue to say that the public are ignorant of what is going on elsewhere in foreign lands, a humble instrument may be often employed in a quiet manner to bring forward the most excellent improvements long in vigour among our continental brethren.

Starting from the railway station at Halle, in Prussian Saxony, after a pleasant ride of four hours in the royal mail diligence, a blast or two from the all but musical horn of the coachman announces to us that we are approaching the celebrated hotel known as the Goldene Schiff. A lively scene ensues as we alight, what with the transfer of passengers and letter-bags and the arrival of branch conveyances which perform the local service. It is just one o'clock, and we are introduced to the *table-d'hôte* by the intelligent and hospitable proprietor of the Schiffchen. Should this be our first visit to Germany we should be struck with the openness and friendly behaviour of our neighbours, upon whom we might be tempted to pass a few quiet remarks. After a short stay at the table all uncertainty would be at an end as to the pursuits of our numerous fellow diners, most of whom resort to this convivial board during their residence in the town. The countenances of our new friends bear testimony to their freedom from care about the morrow; their open features and courteous conduct, coupled with their unrestrained conversation, announce them to be engaged in some honourable and lucrative profession; a certain community of sentiment and great friendliness prevail among them, so that we are led to the belief that they belong to the same walk of life. We will now follow one of the party through the town of Eisleben, for the good old habit of mid-day dinners permits the officials of every rank, leaving their desks, to enjoy a breath of air and repair for an hour to their family circles, or spend their time at the *table-d'hôte*, thereby breaking much of the monotony of an employment often execrated in other countries by young men of spirit.

Since Eisleben is a small town of only 13,000 inhabitants, it will be a matter of some surprise to see the bustling scene on every side. The market place is gay, and filled with booths, where the honest people are tempting the passer by to purchase clothing, hardware, household articles, and other commodities of life as well as food.

Through the throng of townspeople wind in every direction a regiment of young men, whose athletic proportions, intelligent and open countenances, and smart costume are sure to command immediate attention. Dressed as they are in a short black tunic, with something on their caps resembling a death's head and crossed bones, they might at a little distance suggest the idea of the celebrated black Brunswickers. Closer inspection reveals their peaceable appearance. Nothing gaudy about their attire, though not a speck of dust on their neat and trim tunic, which is embroidered on the shoulders with a kind of epaulet of black cord faced with velvet, and the body plaited somewhat in the manner of a shepherd's frock, and rather profusely covered with brass or horn buttons; behind their backs their belt expands into a semicircular leathern apron, upon which they can sit at pleasure, but the use of which is still rather enigmatical. The device they all wear on a black cloth cap, with a narrow red band of the same material (two hammers crossing each other, and surmounted by a crown), at once solves all doubt as to what the employment of these youths may be. They are in fact the Mansfeld miners, who, to the number of about 1,000, are come into Eisleben to receive their months' wages. They congregate before a fine old building, above the portal of which are inscribed in ancient German characters, the words *Gewerken Haus* (Offices of the Company). The pay-day is known all through the neighbourhood as the *Lohntag*, and is looked forward to with as keen interest by the tradesmen as by the miners, for the former generally retain a tithe of the money before it has time to leave the town.

A story is told of an English gentleman, who in the good old times, planned a trip to Paris, without having any acquaintance with the language of the country; with laudable curiosity he sought information regarding all he saw, but to every demand the polite Frenchmen replied, *Monsieur, je ne vous comprends pas*. In a brief space of time our traveller felt convinced that Mons. Je-ne-vous-comprends-pas must be the greatest man in the capital, since everything belonged to him, from the palace to the hovel, and his name was in every man's mouth. More true might it have been had he strayed to Eisleben and taken a drive in the vicinity. Had he asked to whom belonged that public building, foundry, smelting-house, steam-engine? that heap of stones or mass of metal? the employment of such a gentleman, clerk, labourer? whose were the copper, silver, and coal mines, the mills, roads, tolls—even the forests with all the noble game they contained? One answer would have been given to all these questions and a thousand similar ones, they are all *gewerkschaftlich* (belonging to the company); in other words the Mansfeld Mining Company is the life and soul of the town and neighbourhood, the source of riches for all classes, to whom it gives steady occupation, so that it would not be far from the mark to say that 60,000 persons live more or less directly, if not wholly, at least principally, on the Mansfeld mines.

The practical value of the Mansfeld mines by no means depends on the richness of the ore, and the quantity annually raised would not be sufficient argument in its favour; the secret lies in the exceptional geological disposition of the ore; it will, therefore, be well to give a rapid *reconnaissance* of the country.

Metalliferous minerals are found under several distinct and incompatible forms, which do not in any manner interfere with each other, and may thus be classified into three principal groups. The veins may be intimately connected with igneous eruptions of various ages and kinds, such as are prevalent in Jamaica, Tuscany, and Piedmont, now enclosed in serpentine or accompanying greenstone and other rocks. This class is just represented in Britain by the copper of the Lizard district in Cornwall, as well as by the copper mines of Anglesea, and are the least understood, the phenomena which attend the occurrence of the ore being so occult that the laws by which they are governed have still to be worked out; consequently, though sometimes highly remunerative, they are at best somewhat speculative.

Then we have the world-wide distributed and far more important class of ordinary metalliferous veins, styled "lodes" by miners where containing ores; of such, for instance are copper, lead, zinc, and tin mines. These veins are generally met with at the junction of two different rocks, in most cases one or both of which have been at least altered by the action of heat, and would receive from some the name of metamorphosed; or they may fill cracks and crevices, dependent on the cooling of neighbouring molten rock, which has very considerably contracted in the act, leaving large fissures more or less parallel to the plane of contact between itself and the preexisting rocks; these appear to bear an intimate relation to the magnetic pole, whence the more or less perfect degree of parallelism in groups of veins, of the same age, in a given district. As is well-known, such veins rarely reach the surface, and as the heat and intensity of the igneous action were necessarily greatest at a considerable depth, so are the fissures wider, and the ore richer, and in greater quantity, whence the immense depth of many mines, and the strong temptation to proceed still further from the increasing per centage of metal, despite the highly augmented expense of pumping and raising, which could only be justified by the best returns.

The third and last primary class are deposits more or less stratified; coal seams are the type, with the clay-iron ores of the coal measures. Peroxide and carbonate of iron are largely distributed in England, Belgium, and France, parallel to the strata of Palæozoic rocks. Gold is usually met with in a less regular manner in alluvial deposits, having been washed out from distant quartz veins, and is, therefore, only scattered in minute quantities through a mass of useless material. As for copper, the most perfect, and perhaps the sole example of this class, is noticed in the *Kupferschiefer*, or copper-slate of North Germany, and especially of Mansfeld, where the regularity of the bed is in no way inferior over a wide tract of country to that of the best coal seam. This bed (there is only one) lies in general at a very slight angle, varying from horizontality to 20° or 25°; true, in confined localities it is tilted up to 40° or 45°, but in such instances only at the extremity of the formation.

The Hartz Mountains rise somewhat abruptly from the plain which girds them on the E. N. and W.; thus the Brocken, the culminating point, stands out in bold relief, and is visible from a distance in the territories of Hanover, Brunswick, and Prussia, as also on the opposite side from the Thuringian Principalities. The Brocken, rising to the height of 3,940 feet, is the most elevated point in North Germany, and consists chiefly of masses of granite, a rock repeated near Aschersleben, and on a miniature scale on the Kyffhaüser. Around these are porphyry eruptions and numerous metamorphous rocks, among which may be mentioned quartzite, and highly crystalline quartzose rocks, including *Grauwacke*, or clay-slate; these are often excessively hard, and contain the magnificent veins of copper and silver for which the Hartz has for ages been justly celebrated. As a general rule these Palæozoic rocks are so much altered that it is almost impossible to find any organic remains in them; they are much upheaved and excessively convulsed.

Next comes the Permian, a well-developed formation, lying unconformably on the older strata, so as to thin out in approaching Clausthal, until finally lost. In the neighbourhood of Eisleben, and on the Kyffhaüser, the lower part of the Permian rocks consists of several hundred feet of sandstones; the first beds are seldom visible, but close to Mansfeld a natural section reveals its super-position on the *Grauwacke* shales. The prevailing colour of the sandstone is red; it was long considered not to contain any ore, this—with the relation which we shall presently find it to bear to the copper slate—has caused it to acquire the name of *Roth Todtliegendes*. The lithological characteristics are excessively varied; thus, at times it is

a dense fine-grained sandstone, the quartzose particles of which are firmly united together by a ferruginous cement. Other beds are coarser; here and there large rolled pebbles of more ancient rock lie disseminated through the mass; when these augment in quantity it assumes the character of a coarse conglomerate, the elements of which are of very various origin. Thus, in most of the beds, the predominant mineral is quartz, others contain *Kiesel Schiefer* (a silicious rock, much resembling Lydian stone), micaceous and chloritic fragments of a more laminated nature, and even, though rarely, pieces of dark limestone. From the great amount of attrition to which all these minerals have been subjected, they are almost invariably rounded, having probably formed the beach of an ancient Hartz island. I saw one or two specimens of quartz crystals from this rock in the mining school at Mansfeld, though they are great rarities. It would appear that during a portion at least of the Permian period the expanse of waters became restricted into the form of a lake—gigantic trees are found imbedded in the sandstone, often attaining two or two-and-a-half feet in diameter; they are entirely silicified and impregnated with peroxide of iron, which has rendered them so hard that when the adjacent rock has been worn away by atmospheric influences, blocks of silicified wood are carried down into the valleys, where they lie strewn in confusion over the Tertiary detritus and in the ploughed fields. The *Liegendes* occurs on the south of the Hartz, and stretches below Stollberg to Sangerhausen, Mansfeld, Hettstädt, and nearly to Halle; plunging southward of this whole extent to a great depth below the sea level, it re-appears on the very summit of the Kyffhaüser Mountains; again dipping south-west it disappears a second time in the valley near Frankenhausen to come to the surface in the vicinity of Eisenach, and around the Thuringian Forest.

Certain beds of the *Roth Liegendes* are of a deep purple and highly micaceous character, so that they pass into argillaceous schists, a fact best recognised after rains, when the surface becomes covered with tenacious clay soiling the fingers, whereas the sandstone district is pretty free from pools of water, and the ground speedily dries up. The two best sections of the Permian sandstones with which I am acquainted are on the Wipper, above Leimbach, a village about half a mile from Mansfeld, and between the Kyffhaüser and Rothenburg ruins, in the neighbourhood of Frankenhausen.

The *Roth Liegendes* is immediately followed by a very constant bed, not exceeding a few feet in thickness, in many places as many inches, generally free from oxide of iron—whence its white or pale-gray tint; in structure it presents great diversity; as a rule it is a compact, fine-grained, exceedingly hard sandstone, locally termed *Weiss Liegendes*—this demands our attention from its relations to the copper deposits.

Our object in dwelling so lengthily on these rocks will now become evident, for the *Weiss Liegendes* is the floor on which the *Kupferschiefer* strata invariably lie with perfect conformity for many a league. The *Kupferschiefer*, or copper slate, consists of a succession of very thin beds, from two to three feet in thickness, presenting the utmost variety of character, either dark brown schists, soft enough to be cut with a knife, or jet black slate of the greatest hardness, though never sufficiently homogeneous to be of the least economic use as a stone. Some part assumes precisely the appearance of fat caking coal, other resembling the the Belgian *terrehouille*. Other portions again are laminated, and finely streaked with white parallel lines, like little hairs, or even the edges of alternate sheets of black and white paper. Above these argillaceous beds are others, also highly bituminous, but containing a large proportion of carbonate of lime; the uppermost part is, indeed, nothing but an impure limestone. Few genera of organic remains have been noticed in the copper slate; such as exist indicate a tranquil sea, in which little ganoid fish sported in considerable abundance. It seems scarcely probable that there should have been only the two or three genera yet known. The largest fish is the *Platysomus*; the most ordinary the *Palæoniscum Freislebense*, and then other species of *Palæoniscum*; this is a creature somewhat of the form and size of a herring, completely armed with a coat of mail, the little black scales delicately sculptured, the designs being specific distinctions. It occasionally happens that a thin covering of copper pyrites has coated the scales, which gives the animal a magnificent appearance. I saw one specimen of *Palæoniscum* at Eisleben, in which the scales were coated with a deposit of native silver, as perfect as though it had been intentionally executed by a skilful chemist, and, as may be imagined, of surprising beauty. In addition to these fish, plant remains are from time to time brought to light, though seldom in a good state of preservation. In a few instances the carbonaceous particles still remain, so that the most delicate forms are distinguishable by means of the shining surface. These, no doubt, formed the food of the fish.

Above the copper slate, and still Permian, appears the *Zechstein* formation, consisting first of 15 to 20 feet of bituminous bedded limestone, dark slate-blue, approaching to black, and almost free from organic remains. It breaks into masses when blasted with gunpowder, and is considerably harder than the superincumbent gypsum. The transition from the one to the other of these portions of the *Zechstein* formation is abrupt, as the first inch of gypsum is colourless. The gypsum strata, being several hundred feet thick, constitute a striking feature in the landscape. The most important practical point relating to this rock is its exceeding softness and porosity; were it not for the latter fact it would be a far easier matter to work the mines, but where shafts pass through it they present a sort of shower-bath. In the midst of the mass of gypsum are several beds of cellular limestone, full of amorphous cavities, probably due to the unequal dissolving power of water on the constituent carbonates of dolomite; this is the *Rauchkalk*; other thin beds have such a decidedly fœtid odour when struck as to have obtained the name of *Stinkkalk*—this breaks into slabs; thus each kind of limestone is characterised by different physical properties. The gypsum lying below the beds of limestone is locally distinguished as *älter Gyps* (older gypsum) in contradistinction to the *jünger Gyps*, or that which lies above them. In places, the *Rauchkalk* is accompanied by a fine umber or fawn-coloured powder, likewise bituminous, and termed, though improperly, ashes (*Asche*). Here and there the gypsum is beautifully veined with black markings, similar to the inferior kinds of impure alabaster from Tuscany. The variegation of this *Bandgyps* owes its origin to the presence of the *Asche* in streaks and veins, but consolidated, whereas in the former case it is quite loose, and may be fashioned in the hand like clay, and by baking indurates considerably so as to resemble brown brick. No high temperature is needed to give consistency to the "ashes;" indeed, the country people are accustomed to moisten it with a little water, and after placing it in brick moulds, to expose it for a short time to the rays of the sun, when it is at once employed in building their houses. The cement used to bind these bricks together is much of the same nature, or perhaps has the addition of a little lime. As a building material it is durable and inexpensive.

Water lodges in hollows in the gypsum rock, and, in process of time, often wears away deep funnel-shaped cavities. The sulphate of lime then apparently separates from any carbonate, if one may judge from the presence of stalactites and selenite close together in the same cavities. These basins in the gypsum are called *Gyps Schlotten*, by which name they are known to every peasant; in dimensions they vary, some attain 50 or 100 feet in depth, while they often ramify internally so as to offer the most picturesque and fanciful forms. Far more beautiful than the many well known calcareous caverns, which are at best rugged and uncouth, the *Schlotten* have gracefully arched roofs, now low, and immediately afterwards rising into a noble vault, like the chapels and naves of some Italian cathedral; the dazzling white of the smooth

water-worn rock, only here and there blemished by the black veinings, adds to the imposing nature of the scene, which on holiday occasions is one not easily forgotten. So alive are the people to the beauties of these caverns that two of them, at least, near Eisleben, are usually once a year converted into festive halls,

> "Where young and old come forth to play
> On a sunshine holiday."

A careful study of the *Gyps Schlotten* is often of the most vital importance in the working of the mines, for the life and safety of the miner here sometimes depends as much on it as that of the collier on the care with which fire-damp is avoided. In fact, near Sangerhausen, the men were lately proceeding rather unwarily through the gypsum, when the able *Schichtmeister* fortunately came in and desired them not to go any further before boring, as he was convinced that a large gypsum basin was not far ahead. Scarcely had the borer gone a fathom or two into the rock when the reservoir was tapped. Had not this precaution been adopted it is possible that the men might have lost their lives, or been dangerously hurt by the outrush of the waters. When once a *Schlott* has been drained the surrounding rock becomes much drier, nor does it refill. The vegetation in the immediate neighbourhood of a *Gyps Schlott* is perceptibly different; thus we see willows luxuriating, while ferns and other classes of plants are there found, although not a single individual could be met in any other part of the gypsum formation; the rank growth of many succulent plants is equally striking, so that where the *Schlotten* are superficial the botanist is made aware of the phenomenon no less than the geologist. A knowledge of botany would frequently be of great help in making a profound geognostical study of this interesting district.

The gypsum seldom presents any distinct marks of stratification, indeed, I was confidently assured by an acute observer, who has paid much attention to the geology of the district, that it was impossible to tell the dip. I believe, however, that it is perfectly feasible, having ascertained it in numerous places, especially in the neighbourhood of a great fault, and where the dip of the strata, inclining at a considerable angle, coincided with the slope of the hill; the means I adopted was to choose as a starting point a spot where selenite was abundant, and to calculate the dip by the position of the crystals.

Where igneous rocks have come in contact with the gypsum,—such at least is the best explanation which I am prepared to give of it,—the latter has been very much indurated, and by the elevated temperature has lost its water, so as to have become anhydrite. This latter rock has a pale blueish tint; instead of being sufficiently soft to cut with a knife like the gypsum, it constantly requires to be blasted with gunpowder, whence the expense of driving levels through it is at least as much again as in the former instance.

A remarkable form of sulphate of lime is found in small quantities in the gypsum—this is *Schaum Spath*, a mineral so much resembling physically the talcose schists in the neighbourhood of Carrara, as scarcely to be distinguishable from them by the eye.

Next to these Permian strata come other sandstone beds, lying uncomformably on them; they are Triassic, or among the older members of the Mesozoic series. This *Buntersandstein*—variegated sandstone—often closely resembles the *roth Liegendes*, but the ferruginous particles seem to be rather purple than red, as in the older rock. In both cases the quartz remains white, the whole mass not appearing of an uniform colour, as in the representatives of the same formation in England. By far the greater part of the beds of *Buntersandstein* consist of semi-indurated sand, streaked and veined in the most irregular manner, whence its name. At one time it is white or yellowish, at others green, red, or deep purple, mixed up in wavy lines. Sometimes, precisely the same purple colour and schistose character are noticed as were alluded to while describing the Permian strata; a very experienced eye is required to tell one from the other. They are dotted over with small scales of mica, possibly also of selenite, but the size of the fragments is too small to ascertain this without the aid of a microscope. *Buntersandstein* easily disintegrating, the hills which it composes assume a rounded form; the slopes are gentle and the soil light. Potatoes, corn, and other edible plants flourish in this district, as well as cherry trees, but the porosity of the rock is a drawback to the miner, for it absorbs all the rain-water which falls on the surface, and which has, consequently, to be artificially pumped out.

North of Eisleben, but entirely absent on the Kyffhaüser (as is the *Buntersandstein*), is a narrow belt of limestone, not found in Great Britain, which, from the immense quantity of shells which it contains, is called *Muschelkalk*, (shell limestone). It is fawn-coloured, or gray, andabounds with brachiopods.

After the *Muschelkalk*, a great hiatus occurs in the succession of strata throughout this entire district, so that with a single stride we pass to the Tertiary period, represented by deep deposits of clay with brown coal, a fuel to be literally obtained in any quantity desired. The quality of the brown coal will be discussed in its own place. The clays are principally slate-blue or gray, sometimes accompanied by valuable beds of white silicious clay of excellent quality, used in the manufacture of *Chamottes*, or fire-bricks, for furnaces. The heavy price of transport from other parts of Germany or abroad, renders it of the greatest importance to test the relative value of these fire-clays, and were anyone to experiment systematically on them, his labours would be well repaid, for a large consumption would be at once secured the moment a locality had acquired the reputation of possessing clay of more than ordinary refractory properties.

The brown coal formation is very extensive, and fills most of the low ground skirting the Hartz to the E. and S.E. It is covered in autumn with magnificent crops of beetroot, vegetables, and tobacco of an inferior quality, and may be pierced for a depth of 30 or 40 feet without finding the smallest stone. The only newer formation than the brown coal, is the local alluvial deposit along the courses of the valleys, the chief of which is the plain of the Helme, so remarkable for its fertility as to have acquired the name of the Goldene Aue,—(the golden plain.)

In addition to these aqueous rocks the neighbourhood of Hettstädt has been disturbed by an eruption of melaphyry, a complex rock, consisting of pyroxene with labradorite or oligoclase, reddish brown, with small green spots, and intensely hard. It has indurated the adjacent strata, but is itself so difficult to blast that the price for making a few feet of level through it is almost fabulous, the operation requiring an incredible time. We shall soon see that a *Melaphyrkuppe*, or eruption of this rock, has been pierced in order to construct the celebrated adit level at Mansfeld. As far as I have had opportunity of observing, this is the only place where it occurs in this district. East of Eisleben is a porphyry eruption, in the vicinity of Wettin; and of posterior age to the carboniferous formation, for both at Wettin and Lobejun the latter appears to be somewhat altered by it. In some spots it becomes a kind of anthracite, and is of great economic importance for the smelting works.

Through subsequent unequal elevation of the strata by subterranean causes, and their still newer denudation, the copper-slate is no longer continuous as originally, while in many places it lies at such a great depth that we have no means of examining it. On this account this bed may, for convenience, be considered as forming three distinct basins, two in Prussian Saxony, the third in the principalities of Schwartzburg Rudolstadt, and Schwartzburg Sondershausen. True, the employment of the word basin, the best which suggests itself, is rather arbitary, for we have not always a very well-marked margin to circumscribe them. Although absent on the mountain ridges, the copper-slate re-appears on the opposite flank,

the upheaved older rocks forming the higher point. The principal and only well-defined basin may be called that of Eisleben; the whole of the *Kupferschiefer* is there the monopoly of the Mansfeld Company. The best portion of the Sangerhausen basin is likewise the property of the same enterprising body, but lately a new undertaking, called the Stollberg Kupferschiefer Company, has been commenced; they have begun working at the western end, at the extreme south flank of the Hartz. This little strip of country belongs to the Count of Stollberg, but since he is under Prussian protection it practically forms part of the latter monarchy. The last basin is that of Frankenhausen, stretching across the valley of the Fraukenhaüser Wipper from Udersleben to Sondershausen, but there far too deep to be worked; to the north it rises on the back of the Kyffhaüser mountains to the height of 1,000 feet above the sea level, and is a vast and still almost unworked expanse of cupriferous ground.

The margin of the Eisleben basin, by which we mean the outcrop of the copper-slate, may be distinctly traced from south-west to north, and thence to north-east of the town, the curve roughly forming part of an ellipse, the major axis of which runs from north-west to south-east, the direction of the general strike of the strata; outwards this curve is everywhere fringed by the *Roth Todtliegendes*, rising into bold eminences near Mansfeld, one of which is crowned by the superb ruins of the residence of the once powerful and luxurious proprietors of the mines, the multipartite family of the counts of Mansfeld; other heights of the *Liegendes* stretch northward to Hettstädt, and in the direction of Aschersleben, but melt into lesser hills in receding from the Hartz to the south. The eastern margin of the basin approaches the Saale, a tributary of the Elbe, flowing through Halle and the little towns of Rothenburg and Friedeburg an der Saale. The configuration of the ground within the Eisleben basin is rather undulating than hilly, except to the west, where a steep escarpment of gypsum, facing outwards and closely following the outcrop line of the copper-slate, commences near Wimmelburg, a mile out of Eisleben, and sweeps round to the north-west above Creisfeld, Alsdorf, and Hergisdorf, after which it blends with the brown coal basin and the heights of Mansfeld. This leaves an elevated tract of country composed of gypsum, *Buntersandstein*, and *Muschelkalk*, at least 100 feet above the level of Eisleben, and gently inclining towards the susse and salzige Seen to the south-east. The small brown coal "nests" found here and there on this elevated ground are too insignificant to be of more than purely local and private importance.

By making a section from north-west to south-east we should best perceive the synclinal or basin-shaped form of the copper-slate strata; they can only be worked near the outcrop, for in the centre they lie at the depth of many hundred fathoms. The majority of the shafts, lying at some distance, with more or less parallelism to the axis, have been divided into two groups, viz., the *Obere* and *Untere Reviere*—somewhat equivalent to upper and lower "setts." These *Reviere* are again divided into numerous smaller ones. A *Revier* is the primary administrative division of mining or forest property, for convenience of management; each has its superior officers, with their staff; the forest *Reviere* are superintended by a forester (*Förster*); the mining *Reviere* are generally supervised by a *Geschworene*, or local Government Inspector, whose functions, properly speaking, extend rather in the way of helper and counseller to the Company than in any manner to restrict its powers and free mode of action. The ground actually worked away, and no longer of any use, skirts the basin all round; within this comes the present concession, extending further inwards, but this is a comparatively narrow strip having an average breadth of two miles, being thirteen miles long, that is from the Friedeburg Works, near Rothenberg on the Saale to Wolferode.

Spangenberg, in his ponderous "Mansfeld Chronicle," ascribes the origin of the mines to two men named Napian and Neuke, under date of 1199. Napian discovered the *Kupferschiefer* by mere accident, while digging a cellar near the then insignificant village of Hättstädt, and having it assayed, the result proved so satisfatory that he gave the present name of Kupferberg to the spot. Spangenberg attributes the prosperity of Hettstädt, and its rank as a town, to the mines which soon sprung up around. The statutes of Napian and Neuke may be seen in the Gewerken Haus, in Eisleben, a place which also speedily shared in the benefit of the discovery, and whose citizens devoted themselves earnestly to mining enterprize:—

> **" Eisleben, wo Bergleut' schön**
> **In tiefe Schacht hinunter gehn**
> **Und fordern edles Erz zu Tag**
> **Mit ihrem fleiss'gen Hammerschlag."**

The gigantic scale upon which these mines are worked is by no means a thing of yesterday, as may be judged by a careful walk over the ground. In approaching Eisleben towards evening from the west, that is by the post-road from Nordhausen, after passing the village of Blankenheim, we ascend to the top of the hill; the eye soars for many a mile around; the steeples and roofs of Eisleben repose peacefully enveloped in gray mist at the foot of the hills, on whose summit the tall forms of many engine-houses, with their gaunt chimneys, are picked out against the sky, while, at a greater distance, the silvery reflection of the lake indicates the spot where the drainage waters are conducted. Around us, on every side, little hillocks, scarcely larger than the graves in a country churchyard, and almost as close together, stretch to the right and left of the road, and have been for centuries overgrown with grass; as we advance, these hillocks, which might at first have escaped observation had they not been pointed out, assume larger dimensions, and present a distinct though partially filled crater; they become dotted over the fields, reminding one of a city of South American ant-hills; each is encircled at the base with a crown of brambles, giving a most singular effect to the landscape, as the intermediate space is highly cultivated land. Every hundred yards we proceed towards the town these mounds become larger and larger as also less numerous; they begin to bear a more rugged appearance, and instead of being clothed with vegetation present their sterile slaty faces to us, for these are newer burrows, which have not been subjected to the disintegrating action of the atmosphere sufficiently long to convert the rock into soil. A local law, common in such cases, stipulates that whoever rents ground covered with ancient burrows should annually bury a certain quantity of the barren mounds, in order to expose the original surface of the soil, and render the land fit for agriculture. Another moment and we have reached Wimmelburg, where the burrows are from 300 to 800 feet long, and 50 feet high, and nothing but a mass of stones. These are what are at present being thrown up by working the copper-slate, at a depth of a least 500 feet (80 or 90 *Lachter*).

Spangenberg relates how, in 1420, Count Busso VI. of Mansfeld, while staying at Venice, was agreeably surprised by the gift of a noble charger, with golden saddle and silver shoes, offered him on the part of the senate of the merchant city, as a token of their gratitude for the lucrative copper trade with Mansfeld. (*Sächsige Chronik*, 1585, p. 523.) A fine reclining statue of Busso ornaments his tomb in St. Andreaskirche, in Eisleben. I sketched one of the graceful dragon's head water-spouts, formerly ornamenting the Gewerken Haus in Eisleben, and now in the Mining School, as appropriate for the *Journal*. It is a charming piece of *repoussé* work, attributed to the time of Bruno the elder, circum 1600. Many such water-spouts still exist in the vicinity; in former times they were so abundant at Neustadt on the Orla, near Weimar, that Luther facetiously called it the *Drachenstadt*, or "dragon-town." The local use of copper, for many purposes where not generally employed, is very striking. In St. Andreas church, in Eisleben, is a fine brass monument to Herr Von

Eveleven; and four magnificent brass chandeliers, valued at £140 each, presented by the people of Nuremberg, in 1610. There are also some ponderous brass candlesticks, apparently of far older date. The town hall in Eisleben was originally roofed with copper, but this was removed and sold about 20 years ago.

W. P. JERVIS, Ad. Nat. *Scale* $\frac{1}{18}$.

DRAGON'S HEAD WATER-SPOUT, FORMERLY ON THE GEWERKEN HAUS AT EISLEBEN.

For a long period the mines belonged exclusively to the counts of Mansfeld, who held them as direct fief from the emperors of Germany (*kaiserliche Lehn*); the patents or warrants under which they exercised their authority were styled Imperial fief letters (*kaiserliche Lehnbriefe*). We read of the counts being enfeoffed by such Imperial letters patent as early as the middle of the 14th century, thus:—The Emperor Charles IV. issued a *Lehnbrief*, or *beneficium*, concerning the mines to Count Gebhardt, in 1364; Sigismund, in 1437; and Frederick III., in 1444, to Volrath, Günther and Gebhardt, and another in 1457, in which he specifies, among other things, the important and assiduous services which the counts had rendered him on manifold occasions, and might in future render. Bernhardt von Rohr (*Geographische und historische Merkwürdigkeiten des vor-oder unter Harzes. Frankfurt*, 1736, page 707.)

The right of possession and administration of justice in these mines, on the part of the counts, did not embrace the entire country, but was confined to the places designated in these letters. "It extended, 1st, from the Salt Lake (*Salzige See*) to near Hornberg, passing by Rothenschirmbach, Sittchenbach, the [then existing] monastery of Schweinswande, the forest of Krummenhain, Emseloh, the former mansion of Erzgerode, the wood of Eptischine, and the now destroyed village of Lichtenhain (Lichthagen), between Gorenzen and Wippra; was bounded by the Wippra, near Burgörner and Hettstädt, and thence stretched away to the Saale, following its course upwards to Salzke, and returning to the Salt Lake. 2nd. The Castle of Morungen, with the mines comprising the present administrative district of Gross Leinungen, above Sangerhausen." Ahrens, (*Historische Nachrichten über die merkwürdigste Städte, &c., in der Graffschaft Mansfeld, Eisleben*, 1834, p. 48.)

In 1443 the counts of Mansfeld enacted a law whereby the mines should continue undivided. Von Hagen; (*Münzbeschreibung des graflich und fürstlichen Hauses Mansfeld. Nuremberg*, 1778, p. 261.)

In 1484 the Mansfeld mines, ceasing to be held at *Reichslehn*, or in direct fief from the emperors, the legal rights and imperial privileges (*Rechtsgerechtsame*) were handed over to the electors of Saxony, from whom the counts of Mansfeld were henceforward obliged by this treaty to farm them; they were styled *Erz in erstem Feuer*. Up to this year the tithes (*Zehnte*) went exclusively to the counts, but now the electors demanded half for themselves. In 1486, a year or two later, Duke Albrecht invested the counts with all the mines which they had originally held in fief; the revenues continued to be the right of the counts, but they did not work all the mines themselves, preferring to hand them over to certain families in hereditary fief. This gave origin to two classes of mines: those portions (*Bergtheile*) worked by the counts themselves constituted the *Herrenfeuer*, the rest were styled *Erbfeuer*, literally proprietory and hereditary hearths. Already in 1487 the start taken by the new owners, and the riches they derived from their industry, is apparent from the historical documents of the period. The Duke of Brunswick, happening to be on a visit to the Castle of Mansfeld, began loudly to boast of his riches, to which, for only answer, one of the counts of Mansfeld retorted that he for his part was poor, but that his subjects were all the richer. To clear up all doubt, he would order that one of them should exhibit a pile (*Schieferhöhle*) of Mansfeld Thaler, and that another should ride up to the castle with 100 horses. No sooner said than done; in a short time Christoph Stahl, a smelting-house proprietor, produced a cartload of the precious silver coin, and Johann Zörner appeared in the square with 100 of the steeds he employed in conveying ore to the works. (Krumhaar, *Luther's Vater's Haus*, p. 3.)

That the ores from the lower *Reviere* were poorer in silver than the rest was known many centuries ago, for in 1536 a mining law was issued by the counts, enacting that whoever should fraudulently adulterate the Hattstädt ores with those from Mansfeld or Eisleben should be punished. This was on account of the great expense of desilverizing by the liquation process. (See Rohr, *Op. cit.*, p. 696.)

All accounts confirm the truth of the flourishing condition and stupendous scale on which these mines were worked, considering the means of mining then existing. Ratzenberger, physician of the Duke of Saxony, writing about Luther's time, thus expresses himself:—"Our Mansfeld is a very celebrated country, not only on account of its rich produce of corn and wine, but also as being favoured by God with an excellent copper and silver mine, the like of which is not to be found in Germany." (Quoted by Krumhaar, *Op. cit.*, p. 2.)

At this time it is estimated that 20,000 to 30,000 *Centner* (1,000 to 1,500 tons) of copper were annually produced, a quantity only exceeded during late years, with all the improvements of modern science.

The *Hettstädter Chronik* states that the counts obtained a yearly revenue of about 25,680 *Thalers* (£3,850) from the lordship and working of the mines. At the beginning of the 16th century two parts of Eisleben were built by the miners, viz:—The Nuszbreite and the Neustadt.

At the period of the Reformation lived, simultaneously, four Counts of Mansfeld, Gebhardt VI., Bolrad II., and the brothers Albrecht and Ernst; their immediate successors became the heads of three distinct lines. By their wanton luxury this family squandered a large fortune, so that before long they were compelled by dire necessity to retire into private life, aggravated by the almost incredible debt of 2,721,961 Meissen *Gulden*, which at 21 *gute Groschen* or 26½ *silber Groschen* is equal to £357,257 (A.D. 1570); 40,000 Meissen *Gulden*, or £5,250, which formed the annual profit of the mines, was applied to discharge this heavy burden.

(*To be continued.*)

Home Correspondence.

CHARCOAL AIR FILTERS.

Sir,—As I doubt not that the columns of the *Society of Arts Journal* are open to facts affecting science and fairplay, I would beg space in them for a few observations on Doctor Stenhouse's paper, appearing in that publication of the 14th inst.

The writer takes to himself the merit of having discovered the extraordinary properties possessed by "Charcoal," in drawing unto itself and destroying the gaseous emanations from sewers, &c., &c. Throughout the whole of his present paper, as well as the former on the same subject, published in 1854, he assumes the principle of "the charcoal air-filter" to be his invention, and concludes in the present instance by saying, "I think it but justice to myself to state that I have no pecuniary interest in the charcoal air-filter. Though strongly urged to do so, I refrained from securing it by patent, on the ground that inventions for the prevention of disease and death ought to be sold at the lowest possible price, and should not therefore be encumbered with the expense and restrictions attendant upon patent rights."

The truth is, that so far back as 1847-8-9, my publications and papers read at the Botanical Society of London, King's College, the Mechanics' Institute, the Royal Society of Dublin, and the Sanitary Association—on the discoveries I had then made of the special properties of "Peat Charcoal," gave full facts of its powers for deodorizing vitiated atmospheric air, and drawing to itself the deleterious gases afloat in them, as well as those afloat in sewage matter; and described the "air filter" composed of layers of granulated charcoal held in position by wire gauze — exactly what Doctor Stenhouse now claimes as his invention. And the following letter and article, which appeared in the Windsor paper, describes when and where I put "the air filter" principle into actual operation so far back as 1849:—

"Extraordinary Powers of Peat Charcoal.

"(From the Windsor Paper of the 27th October, 1849.)

"It will have been seen by our reports of recent meetings of our Local Board of Health, that Mr. Jasper Rogers, C.E., attended the Board to submit his plans for saving the sewage matter of the town, and entirely preventing its discharge into the river, and the consequent pollution of the stream from which the town is at present supplied with water. At the meeting of Monday week it was determined to place Mr. Rogers in communication with Captain Vetch, whose plan for the main sewer of Windsor the Board had previously adopted, with the object of making the one plan auxiliary to the other. At that meeting Mr. Rogers was requested to visit a very bad cess-pool, respecting which great complaints had been made to the Board, but which it was considered inadvisable to disturb at present, and especially to examine an adjoining house, the owner of which, Mr. Henry Lamb, of Peascod-street, had frequently stated that he was unable to live in it without keeping the doors open, even during the night. After examination, Mr. Rogers, who was accompanied by some members of the Board, stated that he would undertake to render the house pure, and that he was authorised by the Irish Amelioration Society to send down to Windsor a sufficient quantity of peat charcoal to effect the removal of the contents of the cess-pool without the production of any annoyance, and which it was arranged should be accomplished in the following week; but on Thursday week Mr. Rogers returned to Windsor to effect the purification of Mr. Lamb's house. We happened to enter Mr. Lamb's shop immediately after the arrival there of Mr. Rogers, and our attention being requested to it, we can speak from personal experience as to the *mauvais odeur* which proceeded from a recess enclosed by doors, in a small apartment at the back of the shop. In fact it would be difficult to imagine anything worse than the stench that was emitted on opening the doors of the recess. The extent of the evil may be partly conceived from the fact, that the insides of the doors were actually blackened by the action of the sulphuretted hydrogen drawn up by capillary attraction through the wall, from the contents of the cess-pool resting against it beneath.

"By a simple arrangement, Mr. Rogers placed a comparatively small quantity of peat charcoal, accurately granulated, resembling gunpowder in appearance, in such a position, in contact with the wall, as to intercept the gases as they rose, holding the charcoal in its place by a slight wooden boarding. In the course of half an hour after the operation was completed, Mr. Lamb states, the atmosphere of the room was purified, and, to use the words of Mrs. Lamb, 'she felt as if there was a cool breeze in the house.'

"On visiting the place the next day, we ourselves found that the objectionable odour was entirely gone; and the satisfaction of the inmates of Mr. Lamb's house at the result of the operation was expressed in the warmest terms. Mr. Lamb states that he has frequently been obliged to hold his breath on coming down stairs in the morning, until he could get the door open, and that the difference the morning after the operation was most extraordinary."

It is almost unnecessary to say more on this special point; the discovery of the principle, and the putting of it into actual practice, are due to myself; the delay in its general adoption is due to apathy and opposition.

The peculiar powers of vegetable charcoal, or of any charcoal, in drawing to itself the impurities afloat in the atmosphere, were not, if known to anyone, published when I first wrote and lectured on the subject; and one of the first chemists in the world, Dumas, the President of the Commission appointed, at my request, by the Emperor of the French, to investigate the facts of the statements respecting the properties of peat charcoal, used the following expressions to his Majesty in my presence, at the Palais d'Elysées, a short time after I had used the air filter at Windsor. He said, "I have taught my pupils the absorbent and disinfecting powers of animal charcoal on substances, but it has been reserved for this gentleman [pointing to me] to discover the singularly great powers of the charcoal of peat upon vitiated air."

From that period to the present I have unceasingly laboured, against every possible opposition, to make the world understand the numberless powers and capabilities of vegetable charcoal, the most powerful of all being the charcoal of pure peat, principally owing to its peculiar porosity, but also of other properties belonging specially to itself. From time to time almost all I have stated has been gradually admitted; but from day to day, at present, some one or other makes property of my facts. In the present case three scientific names are brought before the world as those to whom the present good is due, whilst my unpretending name is completely ignored.

Permit me to conclude my remarks by the following quotations from the *Freeman's Journal* of the 6th December, 1854:—

"It is a curious fact that nearly all that has been recently put forward by Professor Stenhouse was long since enunciated by Mr. Jasper Rogers. But Mr. Rogers not being a chemist, and being the patentee of peat charcoal, his assertions did not pass current with the public, as will the independent evidence of such a man as the Professor, whose alleged discoveries we have been alluding to."

I am, &c., JASPER W. ROGERS.

Peat House, Robertstown, Co. Kildare,
17th June, 1861.

ELEMENTARY EXAMINATIONS.

Sir,—The establishment of a Central Committee to provide a system of Elementary Examinations on a uniform and fixed standard, is an important step, and deserves the attentive consideration of all who are concerned in the management, or interested in the welfare, of educational Institutes. It can hardly be necessary to insist upon the advantage of extending the stimulus of periodical examination to a class below those which are influenced either by the Society of Arts or the Universities. It must be obvious that if the benefit gained is great in the latter cases, it must be still more so in the former, and that the general adoption of the scheme propounded will doubtless have the effect of inducing a greater number of candidates to prepare themselves for the higher grades of certificates.

The Central Committee, by providing the necessary papers for examination, will not only have secured the important object of a uniform standard, by which the comparative merits of candidates in various places will be fairly tested, but they will have removed one of the greatest obstacles to the establishment of local examinations, owing to the great trouble and expense involved in the preparation of questions. But, by having them distributed at cost price, comparatively little expense will be incurred, and many provincial Institutes will be encouraged to adopt the plan.

It will be seen by the circular issued by the Central Committee, that the Elementary Examinations will be divided into two grades, suitable for junior and senior candidates, though persons of both sexes and all ages will be eligible for either. The programme comprises the rudiments of a sound English education, while sufficient variety is afforded to enable candidates to have a choice as to the direction of their studies.

In many small towns and villages there will no doubt be an apparent difficulty in finding persons competent and willing to undertake the responsible duty of examining the papers and awarding the certificates. This difficulty might, however, be in a great measure obviated by forming branches of Local Boards already established, and in every Institute, or even village, appointing some person of known probity, whatever may be his intellectual attainments, to see that the conditions are honestly carried out, and the papers worked by the candidates themselves without assistance. The papers should then be forwarded by the first post to the Local Centre, and there examined and decided upon.

It is of great importance that the widest possible publicity should be given to the scheme, and it is therefore to be hoped that the several Local Boards throughout the kingdom will distribute the programme to every town and village within their influence, with such particulars as to their willingness to examine the papers, and supply further details, as may be necessary. Local subscriptions will, no doubt, in many cases provide funds for Local Prizes, whilst the certificates will be the most legitimate objects of ambition, having, from the nature of the examination, a national value, current everywhere as testimonials of good character, as well as of attainments in the elements of knowledge.

Very great facilities would be given to the general adoption of the system, if the several Institutes scattered throughout the kingdom, under the names of Mechanics', Literary, and Scientific Institutes, Working Men's Colleges, Mutual Improvement Societies, and other titles, would form themselves into county or district unions, to gain the benefits of organisation and united action. The initiative might be taken by the Institute of the county town soliciting the co-operation of the other Institutes in the county. A small annual subscription would provide the necessary expenses; an annual gathering would bring the several Institutes into personal communication; and local sympathy and support would be more effectually promoted than by isolated efforts. I should be very willing to give assistance in the suggestion of rules, proceedings, &c., if the secretary of any Institute will write to me, addressed to the Mechanics' Institution, Leeds.

The certificates to be awarded to the successful candidates at the Preliminary Examinations should be works of art, so as not only to be desirable for the successful application to which they certify, but also form ornamental decorations for the walls of many a cottage. The Society of Arts must have many competent friends, who would volunteer the preparation of an elegant design, if the wish for it were made known; and as copies might be multiplied without limit, thereby diminishing the charge to each Institute, it is to be hoped that the cost of a really good engraving will not be considered an objectionable item.

I am, &c., BARNETT BLAKE.

RIFLE PRACTICE MARKING.

Sir,—At a recent meeting of the Society of Arts, Lord Elcho remarked:—"What they wanted at the Wimbledon meeting was an apparatus which would enable the public to judge of the merits of the firing, as well as those more immediately interested in the results."

The following system, founded on a method which has been used by Capt. Halford, at Westow, Leicestershire, fulfils the above requirements, and it also closely indicates the position of the hits on the target, with the additional advantage of showing who has made them.

Instead of the markers being stationed near the iron targets, they occupy a position close to the shooters, and are furnished with a telescope of sufficient power to show the chequered lines and bullet marks on the target from the longest ranges. They are also provided with a large light frame, on which is shown an imitation of the real target, and which, for distinction, may be called the marking target; this is elevated about 8 feet from the ground, in order to be seen by the spectators over the heads of those before them, and its size is regulated by the number who may require to see it, a frame 6 feet by 4 feet being sufficiently large for 800 spectators standing at each target. The markers are further provided with discs, to represent bullet marks, which are made proportionate to the size of the marking target; these discs are not merely black and white patches, but are printed with figures corresponding to the number of the shooters up to nine; but as firing-squads generally consist of 10 to each target, one is numbered 0 in order to obviate the introduction of two large figures, and keep the number as large as the disc will allow. The discs are also printed with a small subordinate figure, to indicate whether it is the 1st, 2nd, 3rd, 4th, or 5th shot of the shooter. They are printed with a white figure on a black disc, or a black figure on a white disc, according as they are required to be on the black or white

portions of the marking target. There is also a set printed in red, to distinguish the hits in which the ball has struck the ground before reaching the target, but these hits may be diminished by placing the target on stilts at about 3 feet from the ground.

For quick firing one marker observes the hit through the telescope, and points to, or calls out, the number of the square which is struck, to the marker stationed a few feet above him at the marking target, who then takes a disc, corresponding with the shooter's number, from a partitioned box, and affixes it on the proper part, but when time will permit each marker to register the same shots he has observed alternately, the marking is rendered more accurate, and with the aid of a properly constructed rod to affix the discs from the ground this may be quickly done.

As targets are generally made, it is difficult to see the hits on the bulls-eye and other black portions, even from the mantlet under the old system. To remedy this the bulls-eye and the circle round "centre" should be filed bright and covered with a black mask, which will come off and leave a light surface where the ball strikes; the mask being mixed with turpentine to preserve the metal from rust. The chequered lines are also, generally, too indistinct, and Captain Halford has found this tolerably remedied by drawing a triangular tool down the grooves to remove the mask and show the black metal on the white parts and the bright metal on the black portions of the target; but the lines are rendered still more distinct by painting them.

There are a number of smaller details which it is unnecessary to describe, as they will easily be filled up by any one wishing to use the method. Indeed, the whole matter is so simple, that it is probable a part or all the features now given may have been found to answer by others, without the writer's knowledge, and if so, it goes to prove that the method deserves to be more widely known and employed.

I am, &c., E. T. LOSEBY.

18th June, 1861.

CONSTRUCTION OF RIFLE BARRELS.

Sir,—As we are now in a transition state from a "nation of shopkeepers" to a nation of riflemen, it will not be inappropriate to inquire what is the most suitable metal to use for barrels for that most delicate weapon, the rifle, for on the barrel will depend that constant accuracy in firing which it will be the pride of our riflemen to acquire.

The first question presenting itself is, what are the essential points in a rifle barrel? The reply, a metal perfectly homogeneous and a true bore. I am not going into the question of rifling—that belongs, not to the barrel maker, but to the gun or rifle maker. Let us see how near to these essentials the present rifle barrel comes. All military barrels are, or should be, made from an iron known in the trade as Wednesbury iron, which is, I believe, the best iron in Britain, excepting such as has been purified in the crucible. This is supplied to the barrel makers in "scelps," about a foot long, half a foot broad, and half an inch in thickness, and by them rolled through elliptical rolls some fourteen times, forming them into hollow taper tubes, ready for the boring and turning machines, where we will at present leave them till we examine the merits of iron as a substance for barrels.

The process of rolling elongates the fibre longitudinally, and when the barrel passes into the hands of the rifler the fibre is cut through more or less, according to the turn of the spiral, and presents, under examination with a microscope, a ragged edge, causing the ball to strip and the barrel to foul. Another cause of the barrel fouling and the ball stripping is the irregularity of the iron. All iron, with the exception of the before-named crucible-purified, contains a considerable amount of semi-metallic and earthy substances, most of them being harder than pure iron. After a few shots the barrel gets warm, the expansion is irregular, the hard places expanding more than the soft ones, and thus altering the accuracy of the bore.

The better class of rifle barrels are made of a mixture of iron and steel, and are more irregular in their composition than the military ones, which, bad as they are, I look upon as being superior, as far as metal is concerned, to the fine figured ones. An acid test will make any of them as rough as the rind of an orange in a very short time.

As to bore, it was the opinion of Mr. Whitworth that it was impossible to get a true hole unless bored out of the solid, and, carrying his theory into practice, he has proved its truth by producing a bore hitherto unequalled. He uses cast steel for his barrels, and that is the metal, properly prepared, that I hope to see generally adopted, for, being perfectly homogeneous, and of a granulated structure, you have always an equal expansion and a beautiful smooth bore, and in strength it is as three to one in comparison with iron. I am told that all good American rifles have cast-steel barrels, which have been bored out of the solid bar, while we content ourselves with iron, because we have only one maker (Mr. Whitworth) at present, and he will not supply barrels, but only his own finished rifle. Let our Birmingham barrel makers prepare for supplying these barrels, for depend upon it every rifleman who can afford it will possess one when they are to be had.

A rifle maker in Glasgow is going to considerable expense in machinery for boring out of the solid, merely to supply his own customers. It is his opinion that when sportsmen will dispense with appearance, and not demand a fine figured barrel, steel barrels will come largely into use for sporting purposes.

I am, &c., W. HAWKSWORTH.

Avon Steel and Iron Works, near Linlithgow,
June 27, 1861.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Num.

Delivered on 6th June, 1861.

211. Metropolis Local Taxation—First Report from Committee.
306. Army (Excess of Expenditure)—Statement.
307. East India (Councils)—Copy of Despatches.
303. Army (Grants' Kitchen)—Return.
158. Bills—East India Loan.
159. Bills—Sheriff Courts (Scotland) (No. 2).

Delivered on 7th June, 1861.

295. Houses of Parliament (Fresco Paintings)—Return.
302. National Collections—Return.
305. Navy (Woolwich Dockyard)—Return.
308. Army (Drying Rooms)—Return.
309. Wexford Harbour—Treasury Minutes, &c.
279. New Ross Electoral Division—Return.
160. Bills—Tramways (Ireland) (Amended).

Delivered on 8th June, 1861.

281. Sugar, &c.—Return.
288. Coast Guard Stations—Returns.
311. Railway and Canal Bills—Seventh Report from General Committee.
312. Army—Supplemental Return to Paper No. 213 of the present Session.
259. East India (Finance and Revenue Accounts)—Parts 1 and 2.
247. Coroners' Inquests (Metropolis)—Return.
304. Expiring Laws—Report from Committee.
317. Ecclesiastical and Church Estate Commissions—Abstract of Return.
162. Bills—East India Council, &c.
163. Bills—East India (High Courts of Judicature).
164. Bills—East India (Civil Service).
165. Bills—Dealers in Old Metals.
166. Bills—Parochial and Burgh Schools (Scotland) (No. 2).
168. Bills—Leases, &c., by Incumbent's Restriction.
Census of England and Wales (1861)—Return.
Topographical Department War Office—Report.

Delivered on 11th June, 1861.

301. Army (Chaplains, &c.)—Account.
299. East India (Courts Martial)—Return.
161. Bills—Industrial Schools (Scotland)
170. Bills—Durham University.
Manufactures, Commerce, &c.—Reports by Her Majesty's Secretaries of Embassy and Legation.

Session, 1860.

383 (B1). Poor Rates and Pauperism—Return (B).

Delivered on 12th June, 1861.

161. Public Health—Third Report of the Medical Officer of the Privy Council.
318. Malt—Return.
319. Public Works (Ireland)—Account.
146. Bills—Transfer of Stocks and Annuities.
167. „ —County Voters (Scotland) (amended).
171. „ —Excise and Stamps (as amended in Committee, on Re-commitment, and on Consideration, as amended.)
172. „ —Vaccination.

Delivered on 13th June, 1861.

324 (A). Poor Rates and Pauperism—Return (A).
327. Aldershot—Return.
286. Transportation—Return and Evidence.
173. Bill—Courts of Justice Building (as amended by the Select Committee).

Delivered on 14th June, 1861.

287. East India (Indigo Contracts)—Copy of Memorial, &c.
310. Naval Officers—Return.
321. Public Business of the House—Lords Report.
325. Education Commission—Return.
329. Public Accounts—First Report from Committee.
174. Bills Locomotives (amended).
176. „ —New Provinces (New Zealand).
177. „ —Offences in Territories near Sierra Leone, Prevention.
178. „ —Attorneys and Solicitors (Ireland).

Delivered on 15th and 17th June, 1861.

313. Fire Insurances—Return.
320. Bankruptcy and Insolvency Bill—Lords Report.
322. Poor Removal (Rebecca Kearney)—Return,
342. Pauper Emigration Metropolis)—Return.
338. Railway and Canal Bills—Eighth Report of the General Committee.
328. Highways (South Wales)—Return.
289. Common Law Courts (Ireland)—Return.
322. Poor Law (Medical Relief)—Return.
179. Bills—Removal of Scotch and Irish Poor (amended).
181. „ —Wills of Personalty by British Subjects.
182. „ —Public Works (Ireland) (Advances and Repayments of Moneys).
184. „ —Dean Forest and Hundred of St. Briavels (as amended by the Select Committee).
Belgium (Passport Regulations)—Despatch from Lord Howard de Walden.
Submarine Telegraph Cables Construction—Report.
Customs—Fifth Report of Commissioners.

Delivered on 18th June, 1861.

314. Lunacy—Fifteenth Report of the Commissioners.
333. Poor Removal (Mary O'Connor)—Return.
335. Liverpool and Manchester District County Courts—Returns.
344. Nova Scotia (Gold Discoveries)—Return.
175. Bill—Piers and Harbours (amended).

Delivered on 19th June, 1861.

323. Poor Relief (England)—Second Report from the Committee.
169. Bills—Voters (Ireland) (No. 2).
185. „ —Chatham Dock Enlargement (as amended by the Select Committee).
186. „ —Appropriation of Seats (Sudbury and St. Alban's) (amended).
187. „ —Courts of Justice Building Act (Money).
188. „ —Wills and Domicile of British Subjects abroad, &c.
Railways in India—Report by J. Danvers, Esq.

Delivered on 20th June, 1861.

283. East India (Nawaubs of the Carnatic)—Return.
331. East India (War Charges)—Accounts.
341. East India (Oude)—Return.

Delivered on 21st June, 1861.

334. Vessels and Tonnage, &c.—Return.
339. Sale of Gas Act—Return.
340. Constabulary (Ireland)—Paper.
348. British Museum (Lighting by Gas)—Return.
349. British Museum (Establishment, &c.)—Return.
357. Civil Services—Estimate for Vote "On Account."
183. Bills—Municipal Corporations Act Amendment (No. 2).
191. „ —Government of the Navy.
Public General Acts—Caps. 17, 18, 19, and 20.

Delivered on 22nd and 24th June, 1861.

347. Navy (The "Warrior," &c.)—Return.
291. East India (Indigo)—Return.
337. Conveyance of Mails (Galway and America)—Return.
354. Education Commission—Copy of Paper by Mr. Tremenheere.
330. Shannon Improvement Works (Ireland)—Return.
332 (1). Poor Removal (Rebecca Kearney)—Further Return.
343. Army (Divine Service)—Return.
355. Scottish Universities—Paper.
362. Steam Ships (Parana, &c.)—Return.
364. Japan (Mr. Moss)—Return.
365. Glasnevin Botanical Gardens—Return.
368. Railway and Canal Bills—Ninth Report from the General Committee.

180. Bills—Local Government Act Amendment (amended).
189. „ —Bills of Exchange and Promissory Notes (Ireland) (amended).
192. „ —Bankruptcy and Insolvency (as amended by the Lords).
193. „ —Windsor Suspended Canonries.
195. „ —Metropolitan Police Force Pensions.
196. „ —Harbours (as amended in Committee and on Re-commitment)
197. „ —Passengers (Australian Colonies).

Delivered on 25th June, 1861.

345. Electoral Divisions (Ireland)—Return.
350. Militia (Ireland)—Returns.
358. Army (Effectives)—Return.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, June 21st*, 1861.]

Dated 11th June, 1861.

1492. J. D. Harding, Barnes, Surrey, and W. H. Winsor, Rathbone-place, Middlesex—Imp. in drawing materials and apparatus for the use of artists.
1493. E. T. Hughes, 123, Chancery-lane—Imp. in extracting oil from seeds, and in machinery or apparatus employed therein. (A com.)
1494. C. Cheyne, Great George-street, Westminster—An improved method of constructing safety rifle and other gun ranges.
1495. R. W. Smith and D. Scattergood, Nottingham—Imp. in machinery for manufacturing looped fabrics.
1496. S. B. Singer, Southsea, Southampton—An imp. in the card of compasses.
1497. C. Chalmers, Edinburgh—Imp. in gas stoves.
1498. W. E. Newton, 66, Chancery-lane—Imp. in gun stocks. (A com.)

Dated 12th June, 1861.

1499. W. H. Walker, Liverpool—A floating hydraulic lift stage for raising navigable vessels or other heavy bodies above the surface of the water, and an improved method of "blocking" or "shoreing up."
1501. J. Hope and W. Greenhalgh, Bedford, Lancashire—Certain imp. in machinery or apparatus for cutting turnips, roots, or other substances.
1503. J. A. Calland, Nantes, France—Imp. in the construction of electrical piles.
1504. J. Durrant, Fitzroy-square, and N. A. Harris, Bayswater—Imp. in the form and construction of chimney tops or appliances for surmounting chimneys in order to regulate the up currents and prevent the down draughts.
1507. J. Watt, 2, Westmoreland-place, Camberwell, Surrey—An improved mode of converting vegetable fibrous substances into pulp.
1508. J. Drew, Belgrave-terrace, Weymouth—Imp. in the adaptation of plates or shields to fixed and floating batteries, and also ships for the purpose of more effectually resisting shot or other projectiles.
1509. G. Cox, Victoria-terrace, Queen's-road, Holloway—An improved "floor dog" or cramp.
1511. D. Walmsley and J. Rostron, Disley, Cheshire—Imp. (partly for the purpose of preventing accidents) applicable to hoisting machinery used in mills, warehouses, and other places.
1512. R. Jobson, Dudley, and C. F. Varley, 4, Fortess-terrace, Kentish-town—Imp. in posts or supports for telegraph wires.
1513. J. P. Girard, Coutances, France—An improved coffee-mill.

[*From Gazette, February 28th*, 1861.]

Dated 23rd February, 1861.

471. J. Robinson, Rochdale—Imp. in machinery commonly called log frames for sawing timber.

Dated 4th April, 1861.

833. W. E. Newton, 66, Chancery-lane—Imp. in machinery for cutting files. (A com.)

Dated 5th April, 1861.

840. C. Storer, R. Jones, and J. Storer, Longford, Warwickshire—Imp. in railway brakes.

Dated 14th May, 1861.

1224. T. C. Boutet, 1, John's-place, Brunswick-road, Camberwell—Imp. in obtaining and applying motive power by aero-hydraulic means.

Dated 15th May, 1861.

1242. W. E. Newton, 66, Chancery-lane—Improved machinery for cutting chaff. (A com.)

Dated 1st June, 1861.

1376. L. Bilon and J. E. J. Nappey, 29, Boulevart St. Martin, Paris—Imp. in apparatus for manufacturing bricks and tiles.
1383. T. Ambler, Keighley, Yorkshire—Imp. in top rollers for spinning and drawing frames.

Dated 10th June, 1861.

1472. R. Armstrong, North Woolwich—Imp. in marine steam boilers, parts of which imps. are applicable to other steam boilers, and in apparatus connected therewith.

Dated 11th June, 1861.

1490. T. O. Small, Newcastle-upon-Tyne—An improved optical instrument for the use of designers and others.

Dated 12th June, 1861.

1500. J. A. Dauncer, Bury, Lancashire—Imp. in apparatus for supplying liquid nourishment to infants and invalids, and in the application of such imps. to the feeding of animals.
1506. L. J. J. Pètre, 29, Boulevart St. Martin, Paris—An improved smoke-consuming grate.

Dated 13th June, 1861.

1514. C. Swan, College-hill, London—An improved form of travelling bags.
1515. W. E. Gedge, 11, Wellington-street, Strand—Improved beating apparatus for picking and cleaning substances used in making or manufacturing woven or textile fabrics, more especially cashmeres, alpacas, and other fine materials, preparing the same for scouring. (A com.)
1571. H. Holland, Birmingham—An imp. in the manufacture of umbrellas and parasols.
1518. J. Knowles, Bolton-le-Moors, Lancashire—Certain imp. in machinery for preparing cotton and other fibrous materials.
1519. E. Bing, Ramsgate—Imp. in the construction and fittings of sliding window sashes.
1520. J. Illingworth, Bradford—Imp. in arranging sizing houses, brewhouses, dye houses, and other houses and chambers to facilitate the removal of steam set free therein, also in the construction of troughs for sizing cotton warps, and in boxes or other receivers for holding such sized cotton warps.
1521. F. Gregory, Manchester—Imp. in machinery or apparatus for cutting hay and chaff or other similar purposes.
1522. S. Cook and W. H. Hacking, Bury, Lancashire—Imp. in machinery or apparatus for plaiting or folding woven fabrics.
1523. The Hon. C. Duncombe, Camelford-house, Hereford-street, Park-lane, Middlesex—Imp. in machinery for sawing wood and other substances.
1524. B. Blackburn, 1, York-buildings, Adelphi—Imp. in applying oil or lubricating fluid to locomotive and other axletrees.
1525. T. M. Downing, Handsworth, Staffordshire—Imp. in the manufacture of corks and bungs.
1526. W. Bayliss, Monmore-green, Wolverhampton—Certain imp. in chain-harrows for harrowing land.

Dated 14th June, 1861.

1528. J. Summerscales, Keighley, Yorkshire, and M. Mason, Manchester—Imp. in gas singeing apparatus.
1529. J. Leeming, Manchester—Imp. applicable to steam boilers, furnaces, and flues.
1531. P. Langlade, Aubusson (Creuse)—Imp. in the manufacture of tapestry and other weavings.
1532. T. W. Wedlake, Hornchurch, Essex—Imp. in hay-making machines.
1533. G. Leach, Britannia Mills, Leeds—Imp. in implements for tilling and cultivating the soil, and in boilers for supplying steam to engines for driving the same, which latter imps. are applicable to boilers generally, and especially to boilers of traction engines.

Dated 15th June, 1861.

1535. R. W. Pitfield, Bolton—Certain imp. in self-acting mules for spinning cotton and other fibrous substances.
1536. T. Knowles and P. Aldred, Manchester, and J. Haworth, Salford—Imp. in machinery or apparatus for raising serrated surfaces on rollers.
1537. S. Barnwell, jun., Coventry—An imp. or imps. in the manufacture of upholsterer's fringes
1538. S. Grant, St. James's-street, Westminster—Imp. in breech-loading fire-arms and fowling pieces.
1539. F. Potts, Lombard-street, Birmingham—Certain imps. in the manufacture of metallic posts for supporting telegraph wires, and which said imps. are also applicable for other purposes.
1540. W. Smith, Little Woolstone, Buckinghamshire—Imp. in machinery for giving motion to ploughs, cultivators, and other agricultural implements.
1541. T. Page, Middle Scotland-yard, Westminster—Means and apparatus for facilitating the working and discharge of ordnance placed below the water level.

Dated 15th June, 1861.

1542. H. C. Simpson, Shrewsbury—A new or improved vehicle or car.
1543. T. Gray, 19, Hills-cottages, Union-road, Wandsworth—An improved method of bleaching colored rags and vegetable fibres.
1545. D. R. White, Newcastle-upon-Tyne—Imp. in plummets and gauges for indicating the depth and the height or level of liquids.
1547. T. Mellodew, Oldham, C. W. Kesselmeyer, Manchester, and J. M. Worrall, Salford—Imp. in dyeing and printing velvets, velveteens, and other fabrics with floated threads.
1551. J. Perry, Earle-street East, Marylebone—Imp. in washing machines.

Dated 18th June, 1861.

1553. A. R. Le Mire de Normandy, Odin-lodge, King's-road, Clapham-park, Surrey—Imp. in refrigerating the fresh water produced by condensing steam.
1555. J. Miller, Greenwich, Kent, and H. E. Skinner, Wapping-wall, Shadwell, Middlesex—Imp. in rotary engines.
1557. R. Walker, Glasgow—Imp. in propelling vessels.
1559. W. B. Taylor, Balmes-road, London—Imp. in heating by means of lamps, and in imparting heat to vessels and their contents, also applicable to cooking and to other purposes.
1561. S. Shaw, Birmingham—Certain imp. in printing machines and in apparatus for taking off and delivering the sheets when printed, and which said apparatus is applicable to the printing machines now in use.
1563. J. Dunn, Preston—Imp. in machinery or apparatus for slubbing, roving, twisting, and doubling cotton and other fibrous substances.
1567. W. E. Newton, 66, Chancery-lane—Imp. in electro-magnetic engines. (A com.)
1569. J. E. Kirby, Banbury—Imp. in steam engines and machinery for giving motion to agricultural implements and other machines.
1571. T. T. Jopling, Sunderland—Imp. in machinery for the manufacture of bolts, spikes, screw-blanks and rivets.

Dated 19th June, 1861.

1573. C. E. Butler, Birmingham—An imp. or imps. in the manufacture of riddles or sieves.
1575. J. Fisken, 17, Wharf-road, City-road—Glazing or calendering by steam, horse, or water power textile fabrics which have been worn, made up for use, or sewn together.
1577. P. Pradel, 4, South-street, Finsbury—An improved clasp or fastener.
1579. G. T. Bousfield, Loughborough-park, Brixton—Imp. in brakes for railroad cars. (A com.)
1581. W. J. Harris, Liverpool—Imp. in dry gas meters. (A com.)

Dated 20th June, 1861.

1583. L. Hannart, Brussels—An imp. in the manufacture of gloves.
1585. C. Stevens, 31, Charing-cross—Imp. in spiral springs. (A com.)
1587. H. Lawford, 31, Berners-street—Imp. in folding chairs, folding beds, folding arm chair beds, folding couch beds, and other articles for sitting, reclining, and lying upon.
1589. W. E. Gedge, 11, Wellington-street, Strand—Improved means or apparatus for drying, sifting, and cleansing grain and other agricultural produce. (A com.)
1591. R. A. Brooman, 166, Fleet-street—Imp. in pianofortes, parts of which imps. are applicable to other musical instruments, and to apparatuses worked by pedals. (A com.)
1593. C. Hodgson, Ballard Rathdrum, Wicklow—An improved method of partially drying peat before removing the same from the bog.
1595. W. E. Marsily, Antwerp—Imp. in velocipedes.

PATENTS SEALED.

[*From Gazette, June 28th*, 1861.]

June 28th.
3186. W. Clark.
3189. H. W. Viner.
3191. G. Davies.
5. P. Campbell and T. A. Kendal.
6. W. Cooke.
9. W. Morgan.
10. J. Taylor and M. B. Cooper.
22. P. Pimont.
29. J. Watson and C. F. Halle.
30. H. Gilbee.
40. W. Luck.
85. W. G. Woodcock.
88. W. Bullough.
151. H. Vandercruyce.
199. E. T. Hughes.
619. J. Cimeg.
719. J. Victor and J. Polglase.
721. W. Clark.
819. W. Crighton and F. W. Crighton.
820. M. H. Blanchard.
839. D. Brown, N. Fellows, E. Jones, and W. Brown.
890. W. Bury.

[*From Gazette, July 2nd*, 1861.]

July 2nd.
28. P. Courtais and F. Jammet.
33. J. Sugden, J. Midgley, and W. Clapham.
114. R. Wilson.
138. J. R. Joy.
259. J. H. Johnson.
551. A. V. Newton.
553. W. Kay and I. Kay.
978. J. Whitehouse.
1185. T. L. Jackson.
1245. A. T. Watson.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, June 28th*, 1861.]

June 25th.
1665. H. J. Giffard.

[*From Gazette, July 2nd*, 1861.]

June 27th.
1454. J. Morgan.
June 28th.
1463. J. Shaw.
1464. J. Shaw.
June 29th.
1481. H. W. Wimshurst.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, July 2nd*, 1861.]

June 27th.
1429. T. Markland.
June 29th.
1431. E. J. Hughes.

Journal of the Society of Arts.

FRIDAY, JULY 12, 1861.

COUNCIL.

Thursday, July 4th, 1861.

At the first meeting of the Council since their election, Sir Thomas Phillips, F.G.S., Vice-President, was unanimously elected Chairman for the current year.

The following Institution has been taken into Union since the last announcement:—

Poole, Mechanics' Institution.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if thos egentlemen who have given in their names as Gu arantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £424,700, have been attached to the Deed.

Meetings of the Metropolitan Exhibitors have taken place, and Class Committees for the Metropolis, in addition to those already published, have been appointed as follows:—

Class 3 (Substances used for Food).

Sub-class A (Exhibitors of Agricultural Produce): Mr. Chas. Woolloton, *Chairman* of Sub-committees, collectively and separately. Messrs. S. Ainsworth, W. Christie, W. E. Chambers, and A. Hall.

Sub-class B (Exhibitions of Drysaltery, Grocery, &c.): Messrs. C. Hewitt, Blackwell (Crosse and Blackwell), J. Broomhall, E. M. Nelson, W. E. Bartlett, W. J. Bellville, H. Schooling, H. Dodson, and R. Jones.

Sub-class C (Exhibitors of Wines, Spirits, Beer, and other Drinks and Tobacco), Messrs. H. P. Gilbey, J. L. Levitt, S. Mart, Dahlke, W. Gow.

Class 4 (Animal and Vegetable Substances used in Manufactures).

Sub-class A (Exhibitors of Oils, Fats, and Wax, and their Products): Messrs. T. M. Smith, B. B. Turner, Jno. Cunnington, W. W. Williams, and Lyner Neighbour.

Sub-class B (Exhibitors of other Animal Substances used in Manufactures): Messrs. G. Darney, W. Buxton, Marcus Samuel, W. W. Jewesbury, and Chas. Farlow.

Sub-class C (Exhibitors of Vegetable Substances used in Manufactures, &c.): Dr. Collyer, M.D., Messrs. Hancock, R. Fauntleroy, Thos. Treloar, and E. Hyde.

Class 17 (Surgical Instruments and Appliances):—(Surgical Instrument Makers), Messrs. R. Williams, Coxeter, Simpson, Matthews, and Rein; (Surgical Bandage Makers and Anatomical Machinists), Messrs. Bigg, Grossmith, and Ferguson; (Dentists and Dental Instrument Makers), Messrs. Hallam, Harnett, and A. Gabriel.

Class 20 (Silk and Velvet):—Messrs. R. Harrison, Stone, D. Keith, P. A. Taylor, S. Lewis, J. Snelgrove, and S. Hicks, with power to add to their number.

Class 29 (Educational Works and Appliances): Sub-class A (Publishers), Messrs. W. H. Cremer, Sen., Darton, and E. Stanford (*Chairman* pro tem.)

Sub-class B (Apparatus Manufacturers): Mr. C. K. Wylde (firm of Reeves and Sons), Capt. Morrison, R.N., and Mr. B. Wright.

Sub-class C (Toy and Games Manufacturers): Messrs. Jacques, Mead, and Normand.

Class 32 (Steel and Cutlery), Messrs. S. J. Addis, G. Gallienne, E. T. Burgess, J. V. Hill, E. Mappin, J. N. Mappin, and Matthews.

Class 36 (Manufactures not included in previous classes), Messrs. Asprey, Leuchars, West, Allen, Southgate, Bazin, and Gale.

The following Foreign Commissions have been appointed, in addition to those already published:

Monte Video.

Dr. Don Manuel Herrera y Obes, *President.*
Don Xavier Alvarez, *Secretary.*

Norway.

Captain-Lieutenant Steenstrup, *Chairman.*
Baron H. Wedel, Jarlsburg.
Mr. H. Schon.
Mr. O. Pihl.
Mr. Schübeler.
Mr. H. Christie, *Secretary.*

Mr. E. Tidemand, of the Royal department of the Interior, will be sent to London to assist at the reception, arrangement, and return of the goods to be exhibited, and will generally take care of the interests of Norwegian Exhibitors.

Grand Duchy of Nassau.

The Central Authority for the Administration of the Interior will act as a Commission.

Bolivia.

Mons. A. Anthoine, of No. 2, Langham-place, London, W., has been appointed the medium of communication.

THE MANSFELD COPPER-SLATE MINES IN PRUSSIAN SAXONY.

By W. P. Jervis, F.G.S., Mining Engineer.

(*Continued from page* 598.)

Although as great in extent, the management of the mines at the commencement of the 16th century was very different from what it is now; ceasing to be worked by private persons, they were acquired by the counts. In 1536, the assembled counts resolved to divide the mines, formerly administered together, into five parts, three of which were shared among Counts Hoier, Günther, and Ernst, of the *Vorderort;* the others between Counts Albrecht and Gebhardt, of the *Hinter* and *Mittelort*:* the total number of the mining properties or *Feuer* was 95, that is 55 *Herrn* and 40 *Erbfeuer.* The *Vorderort* comprised 33 *Herrn* and 24 *Erbfeuer*, in Eisleben, Bornstedt, Mansfeld and Hergisdorf; the *Erbfeuer* were in the hands of the families Drachstedt, Fürer, Blankenberg, Pucker, Bruckner. To the *Hinterort* pertained 11 *Herrn* and 8 *Erbfeuer* in Gross Orner and Eisleben; the *Erbfeuer* were the property of the families Stahl, Fürer, and Beckmann. The *Mittelort* embracing the remaining 11 *Herrn* and 8 *Erbfeuer* in Eisleben, Wimmelburg, Mansfeld, and Leimbach; the *Erbfeuer* were in the possession of the families Drachstedt, Müller, and Memhardt. The central point of all these undertakings was the then flourishing town of Mansfeld, the size of which must have been much greater than now, to judge by the extent of the ruins.

It was a wintry November day, in the year 1483, when two poor peasants, Hans and his wife Margaret, who had trudged along all the way from Möhra, near Eisenach, in Thuringia, entered Eiseben to attend

* These terms expressed the part of Mansfeld castle occupied by the counts of each line, whether the front, back, or centre.

the fair. Margaret sought a resting place at the hostelry, where almost immediately afterwards she gave birth to a son, whom she called Martin, after the patron saint of the day. The parents repaired the following year to Mansfeld, where Hans became a miner, and Margaret brought fire-wood on her back from the forest. With industry, frugality, and rectitude of conduct, they prospered visibly. Martin was first placed at the burgher school at Mansfeld, at the age of 5 years, and thence transferred to Magdeburg; meanwhile, from 1491 to 1502, Hans was placed on the magisterial bench at Mansfeld, and sent his little son to Eisenach. By his industry he was removed beyond the reach of want, and, no longer compelled to work with pick and gad, rented two *Herrnfeuer* smelting furnaces from the counts, and became a burgher; thus, in 1501, he was able to place Martin at the University of Erfurt, for he had a great passion for literature and sound knowledge, insomuch that he would associate with most the educated men in the town, and sought a distinguished position in the law for his boy. The dutiful son thus records the fact:—"My father, with deep love and affection, keeps me at the high school at Erfurt, and by the sweat of his brow has succeeded in getting me here."—Krumhaar. The writer of these touching lines, the miner's son, was no other than the great Martin Luther, and thus may we say that the Reformation sprang out of the depth of the Mansfeld mines. Nor was the Reformer unmindful of his birthplace, where he happily lived to see his work take root, the princes, (at least, nominally) embrace the principles of the Reformation, and order succeed to political jangle. Two large burrows are now pointed out close to Mansfeld as having been those produced by Hans Luther's metallurgical industry, which everybody knows as Luther's Halden.

Regarding the succession to the *Erbfeuer* the following clause was enacted: "Since part of the *Feuer* are given to the smelting masters in hereditary fief, our decree (*Ordnung*) enacts that we wish and intend that the hereditary proprietors should remain, nor will we oppress them on that account; in case that one of the *Feuer* should, by virtue of our *Bergordnung*, lapse to one of us, or that the smelting-master should die without heirs, the count from whom he held it shall have the preference before other purchasers." This was drawn up in order to settle a feud between the litigious counts, but without success. In 1540, Philip, Duke of Brunswick; Wilhelm, Count of Neuenar; and Günther, Count of Schwartzburg, were made umpires in an affair relating to the charcoal trade. In 1541 a general meeting of the assembled counts was held, by which the chief management of all mining affairs was vested in two noble counsellors (*Rathen*), Wolf Schenk and Mark Stor; and four stewards, Oswald Müller, Hans Stahl, Wolf Pucker, and Pesch Rink; these had at their command eight directors (*Bergverwalter*) and four inspectors (*Geschworene*). Albrecht, resolving to pay off the debt as far as possible by better management and economy, sought with little or no indemnity to convert the eight *Erbfeuer*, given to him by the decree, into *Herrnfeuer*, and at the same time to circumscribe the powers of the smelting-masters placed in charge of the existing eleven *Herrnfeuer*. A feeling of discontent naturally followed this glaring act of oppression, which Luther felt himself called upon at once to quell by his personal authority. He urged his appeal in the gentlest manner. The following are his words:

"To the Most Noble and Highborn Lord, Albrecht, Count and Lord of Mansfeld, my Beloved and Gracious Sovereign.

"Grace and Peace in Christ!

"Most Gracious Lord,—For a long time I have not requested anything, yet now I must come once again lest the path of petition be overgrown with grass; but I most respectfully beg that your Grace will attend to my demand, that I may not be deterred and return with the notion that your Grace is unfavourable to me, knowing that I have not deserved such treatment. Here is the burden of my letter:—I was lately at the Court, whither, however, I care little to resort. In the course of conversation it was mooted by persons of high standing, who had no bias in the matter, but wished to point out the inevitable course of events, that your Grace had acted very severely towards the smelting masters, and that prosperity would finally be fairly banished from the county. Much was spoken regarding the cause of this, which I cannot forbear to point out. I thereupon inquired on what footing of friendship I stood, and was informed that my father-in-law Mackenroth had declared that these transactions would reduce his family to beggary. 'God forbid,' replied I, 'he has nothing save his mining property (*Erbfeuer*), and I pledge myself to write to my lord about it.' My father-in-law has not mentioned anything further to me about this affair, except that I once, in pure joke styled them smelting task-masters (*Schlackentreiber*) instead of smelting lords (*Schlackenherrn*); they smiled, saying that in a short time such an appellation would not be very inappropriate. Such are the remarks which dropped at the Court.

"I therefore pray that your Grace will grant me a great favour by acting the part of a lenient lord towards the good Mackenroths, and treat them mercifully, seeing that your Grace, though great and rich, cannot do anything with poor subjects, however good, but will rather draw down God's anger on yourself, for with Him it is but an easy matter to render the rich penniless, or to enrich the poor. I ask not for this as a right, since I neither know nor desire to fathom the merits of the case, but rather as an act of mercy and favour, since your Grace himself will need God's grace and mercy, as your Grace knows perfectly well. If we stand too strenuously to our rights at the hands of our neighbours, steeling our hearts against all compassion, God will also demand justice at our hands, nor allow his mercy any longer to beam on us. I hope that your Grace will not interpret anything further from this than that I regard your Grace as the beloved Sovereign of my country, and serve you with true fidelity; for which very reason I cannot suffer that anything harsh should be spoken relating to your Grace, far less can I have it on my conscience that I should dread that God's anger should descend upon your Grace without my warning your Grace in time. I solicit a favourable reply. God speed the matter. Amen!

"Your Grace's obedient,

"Martin Luther.

"Trinity Monday, 1540."

—(Walch., *Luther's Briefe*, xxi., p. 435.)

Luther also wrote to Duke Moritz, one of Albrecht's liege lords, saying that the latter ought to treat his subjects with more gentleness; that worldly power was bestowed on the nobility for the purpose of protecting the innocent and punishing the bad. To treat the people like dogs and swine was a sure proof that they despised God, the Christian faith teaching us that we should all honour each other as those who have been ennobled by the blood of Christ in an eternal kingdom, compared with which temporal nobility with such miserable worldly rank was a mere nothing. Should the nobility persevere in the course they had hitherto adopted in Germany, it would become worse there than among the Spaniards or Turks, but the tide would flow back on themselves.—(See Krumhaar, *Die Graffschaft Mansfeld in Reformations Zeitälter*, page 261.)

The strife became more terrible when Counts Philipp and Hans Georg, the representatives of the Vorderort, endeavoured to confiscate the 33 mining properties (*Herrnfeuer*) belonging to them as fiefs (*Lehen*). The intrepid Reformer was again at his post of conciliation, and, in 1542, he wrote to the two counts in unequivocal language, saying, that if they acted in this manner towards their dependents, taking possession of what was not their own, the higher gentry would imitate their example towards the lesser, and as the nobles treated the landed proprietors,

the higher princes would act towards themselves and the nobility, since this was not the personal property of the Counts but vested in fief. Therefore, let Count Albrecht beware lest he consider the county and all its property as his own, for God will not suffer such a thing. The property of the nobility is subject to fiefs, according to imperial law, and consequently divine right. Whosoever shall assume to himself possessions accompanied by a fief cannot have God's blessing abiding on him, but directly infringes the commandment, "Thou shalt not steal." Although Count Albrecht is the sovereign of the land, he is not lord over the fiefs and properties; at best he is a Count, and not the Emperor. "Your Grace has a blessing at the hand of God in the land (the mines); beware, lest He take it away from you, and that your posterity have reason to complain, 'Alas, what a rich and highly favoured territory has our predecessor ruined.'" (Walch; xxi., 463.)

Early in 1546 Luther, distressed at the incessant scandals produced by the mal-administration of the counts of Mansfeld, resolved on going back to his native town to put a stop to the disturbances. Setting out with Dr. Jonas, he arrived as far as Halle, where the Saale was so swollen that they could not cross. Having at length passed the river, they were accompanied by a mounted escort, and brought into Eisleben, where Luther at once proceeded with his work of pacification. He had, however, acquired the seeds of disease during his delay at the river, and this began rapidly to assume more virulence. Undaunted, as usual, by any difficulties, he forgot his bodily weakness, and was favoured with success in a work in which little success was probable, for he reconciled the whole of the counts. His next object was to put their sincerity to the test, by stipulating that they should duly provide for the spiritual and temporal education of their subjects, extorting from them a promise that they would furnish the emoluments of the pastors and schoolmasters at Mansfeld, Eisleben, &c., as well as for all the persons dependent on the several churches; further, that they would found a seminary, or gymnasium, at Eisleben, for the education of such as desired to pursue knowledge in its higher branches, but especially in connection with the ministry. This document Luther drew up in due form, and when completed, obtained the signature of the now pacified counts, with the promise of the 50th *Centner* of all the refined copper to be raised for ever from the Mansfeld mines to defray the expenses.

Having accomplished so noble a task, and brought good out of evil, Luther's bodily frame rapidly underwent dissolution, for he never again rose from the bed where he was lying opposite the St. Andreaskirch, in Eisleben. Overpowered by weakness, he rapidly sank, and probably—a circumstance which cannot be omitted here—the last paper he ever held in his hand, and the final transaction of his eventful life, was this interesting mining document. Two days more and his warrior spirit had sped his flight to a brighter world. We may, therefore, regard Luther not only as the great luminary of the dark ages, to whom we may ascribe much of the grandeur and moral pre-eminence of Britain, but with equal truth affirm that his dying act of pacification saved the Mansfeld mines from ruin, and was in great measure the origin of their present prosperity. During the course of the year the counts abstained from their tyranny, and Albrecht, in taking possession of twenty *Erbfeuer*, paid the smelting-masters 200 florins each. (Krumhaar, *Die Graffschaft Mansfeld*, &c., p. 264.)

In 1559, however, new troubles disordered the community on account of the reckless extravagance of the counts, through which the miners, unable for a long time to obtain their pay, suffered the greatest need. At length, on the 22nd April, 1557, they struck, and, abandoning their work, demanded immediate payment; they even threatened with pain of death any miners who should still work, but by good understanding affairs were brought about peaceably. In 1559, Spangenberg (*Mansfeld'sche Chronik*, p. 479) says, that upwards of 100 miners had left their work and gone off to the war in Detmarsch (Holstein).

In 1562 the counts of Mansfeld made some regulations regarding the smelting works and copper and coal mines. In 1567 a council was held to decide how the mines could be best conducted, in order to bring in revenue to the State and remunerate the owners. Not long afterwards (1572) the counts concluded a contract for ten years with some persons conversant with such matters, who promised to manage the mines so as to make them render better returns. The capital had been for a long time held by a Nuremberg company, who employed at one time as many as 2,000 men—(Von Hagen, *Op. cit.*, p. 261.); when, in 1618, four-fifths were handed over to the Town Council of Leipzig for ten years.—(Rohr. *Op. cit.*, page 707.)

To the antiquarian miner let the writer strongly recommend a short visit to Luther's natal house, containing, among other objects of highest interest, the portraits of many remarkable historical personages of the sixteenth century, besides the various mining celebrities. One quaint panel, attributed to Albert Dürer, has a double signification, probably as a precaution. It represents Nebuchadnezzar, with his crowded court, gazing at the three Hebrew youths in the fiery furnace; but no less gives us the portrait of Luther before the Emperor Charles V. at the diet of Worms, in 1521. Besides Luther, we have the portraits of Spalatin and Dr. Jonas, and numerous other reformers. Tezel also figures in the court. On the left is Stossnach, a miner of the times, and in the background a view of Eisleben and the Mansfeld mines, with groups of miners in their ancient costume, at the windlasses. The smelting houses also appear, with numerous other interesting details.

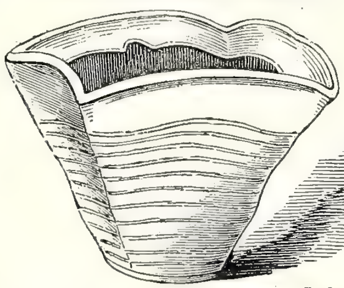
The disastrous thirty-years' war, (1618-48,) did great damage to the Mansfeld mines, and the works were almost suspended, for at one time only 20 miners were employed. —(Von Hagen, *Op. cit.*, p. 261.) On the road-side, just beyond Eisleben, and close to the windmills, is a large mound of slag, known as the site of Stahl's smelting works, destroyed in 1631, but not a trace of the building remains. A similar mound of slag exists on the opposite side of the brook, the works having been simultaneously devastated. From 1636 to 1639, the soldiers quartered themselves six or seven times in the ruins of Stahl's works, where they demanded bread, beer, and provisions to be sent them from Eisleben, and plundered the neighbourhood at every moment. The men had to fly for their lives, and so great was the spirit of animosity, that every vestige of industry was levelled to the ground all round, so that, as everything had to be recommenced, we may view this as an epoch in the history of the mines.

Rohr, writing in 1736, states that in his time there were already 20 shafts at work in the Mansfeld mines, producing about 80 *Fuder* (214 tons) of ore weekly; the four furnaces yielded annually some 1,200 *Centner* (60 tons) of copper. Argentiferous copper-slate, accompanied by cobalt, (not then treated,) was worked at Wiederstedt, three or four miles from Leimbach. He alludes to the already very ancient slag mounds, near Sangerhausen, to prove that those mines must have been worked for centuries, and says that before the 30 years' war they produced considerable profit, though they had been abandoned. He specifies two localities where copper mines had existed; Botfeld, near Sangerhausen, and Bontendorf, where the copper contained a few *Loth* of silver per *Centner* (probably $\frac{1}{1000}$th).—(*Op. cit.*, p. 696.)

The construction of adit-levels, the formation of more regular shafts with continuous workings, the introduction of the steam-engine, and the improvements in smelting and desilverizing, inaugurate some of the successive advances which bring us down to our own times. The mines again improved after the treaty of Westphalia, in 1670; Karsten, a director, applied 30,000 *Thaler* (£4,500), from the profits as a reserve fund; in the following year several capitalists invested their money in the undertaking. We learn that in 1723 three-tenths of the royalty went to the count, and seven-tenths to the Town Council of Leipzig.—(Von Hagen, p. 261.) Meanwhile the Counts of Mansfeld died out, and the land fell under the victorious arms of Napoleon I., who gave it to Jerome, the

new King of Westphalia, a country much larger than the present Prussian province of the name. In 1814, Mansfeld, with a large portion of Saxony, was ceded to Prussia, since which time the Saxon weights and measures have given place to those of Prussia. The mines were administered in six parts, each divided into 128 shares (*Kuxe*) held by private persons. Each smelting establishment yielded its own dividends, but as this was found to be very complicated, they were consolidated under one general superintendence in 1851; since then the dividends of the 768 shares have been equalized.

In ancient times small pits were sunk, and the moment water accumulated to any amount, so as to render pumping difficult, a fresh one was begun close by, often only a few yards off, somewhat on the principle of bell-pits. To say nothing of the experience of such a rude way of mining, much ore was lost. All the ground near the outcrop was thus worked, or rather destroyed, by the ancients, though, fortunately, they only proceeded to a very inconsiderable depth, leaving the best parts of the basin untouched. Since the introduction of gunpowder this anti-



Scale $\frac{1}{3}$.

EARTHEN POT FOUND IN A VERY ANCIENT PIT NEAR HELBRA.

quated system has been entirely superseded; the drainage of the Eisleben basin has been effected by 17 adit-levels, nine of which are no longer employed, owing to the ground having been worked away. They are by no means all connected together, but terminate according to the requirements of the mine at the nearest water-course.

The relative depth of the levels, invariably reckoned from a guage mark on the door-post of the turnpike at Kloster Mansfeld, is here given in Prussian feet:—

ABANDONED ADIT LEVELS.

		Prussian feet below guage.	
1. Gute Hoffnung adit level	...	20·31	
2. Hundkopf ,,	...	44·65	(entrance.)
3. Johann Friedrich ,,	...	49·04	,,
4. Hohheit ,,	...	50·59	,,
5. Jacob Adolf ,,	...	52·69	,,
6. Faulensee ,,	...	56·64	,,
7. Wiederstedt ,,	...	56·64	,,
8. Todthügel ,,	...	61·83	,,
9. Langenthal ,,	...	80·79	,,
10. Naundorf ,,	...	82·81 84·63	,,

PRESENT ADIT LEVELS.

		Prussian feet below guage.	
1. Jacob adit level	...	48·46 49·17	entrance.
2. Glückauf ,,	...	53·37 59·90	entrance.
3. Froschmühlen ,,	...	70·17 74·71	entrance.
4. Zabenstedt ,,	...	73·97 75·62	entrance.
5. Erdeborn ,,	...	74·71 77·84	entrance.
6. Schlüssel ,,	...	85·19 87·32	entrance.
7. Heinitz ,,	...	88·40 89·31	entrance.

Of the latter list the principal is the Schlüssel Stolln, not yet completed, though 13 miles (10,000 *Lachter*) long. The finished portion extends from Gottesbelohnung to Burgörner, Gerbstedt, and thence to the Schlenze at Friedeburg on the Saale; another part is completed between Wimmelburg and Helbra. The object of this stupendous undertaking—certainly one of the most remarkable engineering works of the kind in existence—is to form a common outlet for the waters of the mines at the Saale. Its dimensions are at least a fathom wide and high above the tramway and planks serving for communication and the conveyance of ores, below which is a deep trough for the water. Part of this adit was made too small, and the extent of the workings necessitating a speedy improvement, it was enlarged at great expense, with no small amount of difficulty, as the water already flowed through it.

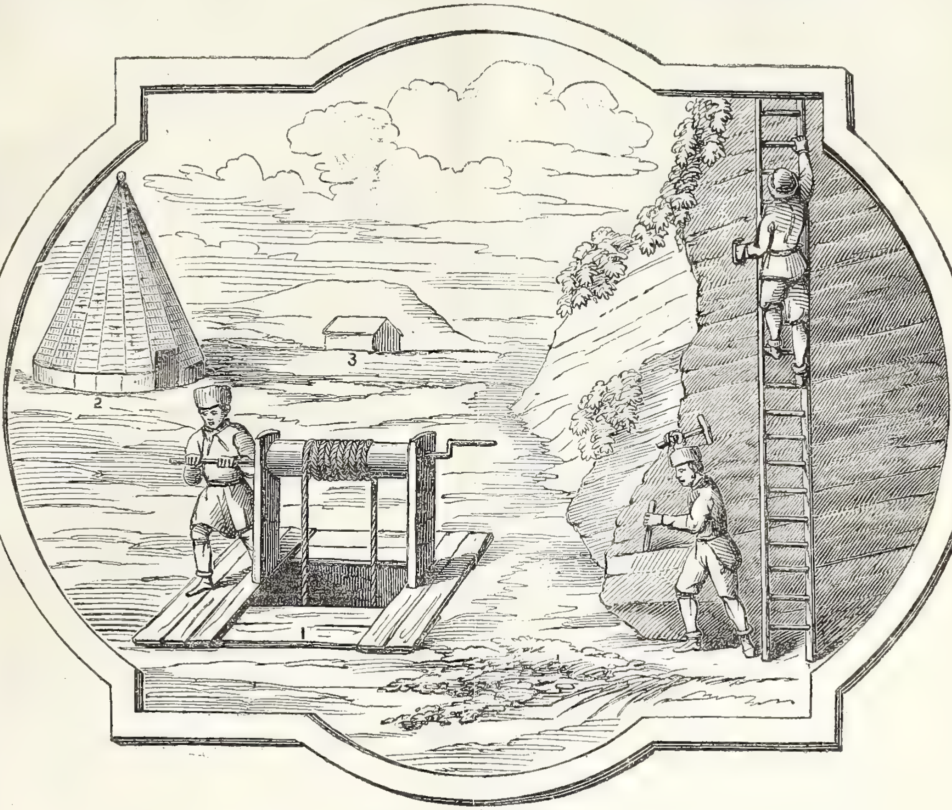
In order to construct the levels, shafts were sunk at short distances, and the rock brought up to the surface directly, the adits follow the copper slate at given depths, being generally so contrived that the upper two-thirds lie in the slate, and the remainder in the *Liegendes*, in order that the water may neither incommode the miners nor flood the ore in the direction of the dip. The fall given to the water is insignificant.

Of about 40 shafts, employed for the use of the miners and extraction of the ore, the majority are convenient and spacious; they are rectangular, and divided into three parts, one for the ladders and pumps, the others for the waggons which are placed on platforms, gliding up and down in guides at either side. Since both exterior and interior communication is effected by tramways, the platforms are supplied with rails, the waggons being kept in their place by an iron bar at each end. The frame is invariably prevented from falling to the bottom in case the chain breaks midway by a spring connected with two levers. If an accident occur, and the frame be freed from tension from above, the spring is instantly liberated from its collar and the arms gripe the sides of the guide.

At the commencement a simple windlass (*Haspel*) is set up, worked by two men who raise the ore in "kibbles" (*Kübel*), large barrel-shaped buckets attached to a rope; it is only when the shafts are properly arranged, and the depth much greater, that a horse whim (*Göbel*) is erected. This is a conical building, 60 or 80 feet high; the masonry only reaching a couple of feet above the ground, serves as an abutment for the rafters of a roof, covered with pieces of wood in the shape of tiles. In the centre is a vertical axis, resting on the ground, and passing through the apex, this is furnished above with a drum for winding the wire-rope, and below with two arms for the horses. *Göbel* may be seen among other places at Martin, Wassermann, Erdmann, and Hornickel shafts; the *Haspel* is never long in use at one place. An ancient painting in St. Andreas Kirch, in Eisleben, of which an engraving is given in the next page, represents both these mechanical contrivances which have been used here for centuries precisely the same as they are now.

In deeper shafts the motive power in raising the ore is steam or water; the machinery is of German manufacture. At the Schmidt-shaft the raising engine (*Fördermaschine*) is 7 horse-power, with 6-foot stroke; it works 8 hours daily, consuming 7 *Tonnen* (19 cwt.) of brown coal, and also serves alternately to work the pumps and man-engine. At the 80th ventilating shaft, (*Lichtloch*) is a pair of oscillating engines, working with high pressure steam of 42 lbs. to the square inch. The 81st ventilating shaft is provided with a 16 horse-power high-pressure beam-engine, with 3-foot stroke and 14-inch cylinder, working with 42 lbs. pressure to the square inch; it was manufactured at the company's own foundry at Saigerhütte Hettstädt, and erected a couple of years ago. It is only used for 8 hours every other day. The wire rope is passed round a double drum, one part of which winds up as the other unwinds; a peculiarity in the arrangement is that the drum is placed diagonally at an angle of 45° from the floor to the beams above; it is connected with the engine by cog-

wheels. The quantity of water in the higher levels is considerable; Herr Richards, the inspector of the machinery, has lately devised a very beautiful and simple contrivance to supersede the use of steam, but which I have not noticed in any other mines, though, from its great economy, it deserves attention; this he calls a hydraulic balance (*Wasser-balance*). It consists of a pair of rectangular boxes, formed of thin boiler-plate, firmly bolted and water-

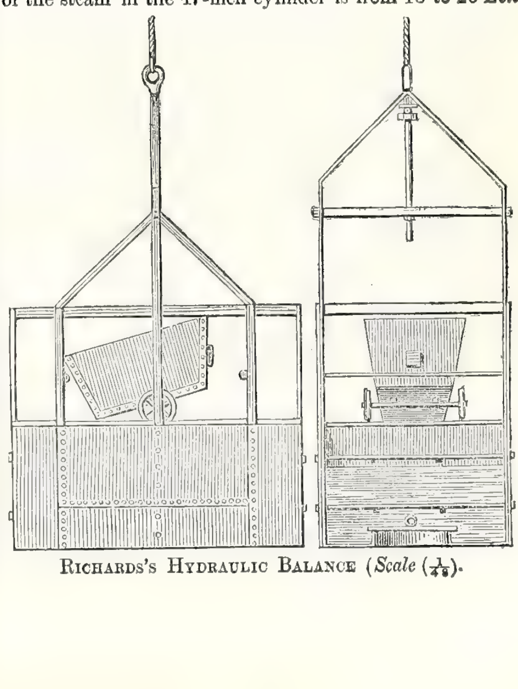


Glück auff hinauff!

1. Man at Windlass (*Haspel*). 2. Horse-whim (*Gobel*). 3. Wooden office (*Zechenhaus*).

tight, 6 feet by 4, and 2½ feet deep; they are kept in shape by 4 longitudinal and 4 latitudinal bars ¼ of an inch in diameter. They are suspended by a light iron frame, and connected at either end of a wire rope with the drum. To raise the ore the vessel is filled with water by a hose at one of the higher levels or at the surface, as may be; it then sinks by its own weight through the shaft to the lowest level, drawing up the empty case and a waggon of ore attached to the opposite end of the rope. Nothing can be easier than the management of this balance; a man stands by the break, a long wooden lever, and gives the necessary freedom of motion, he can instantly stop the case in its descent by applying the break in a horizontal position, and as easily set it going again by liberating it. From 6 to 7 *Centner* of ore are raised each time in a little hand-waggon placed on a platform over the balance. The water is at once emptied from the case by raising a valve at the bottom. One of these machines may be seen at Müller shaft, Burgörner, another at Carolus shaft, Sangerhausen. The water is supplied at the latter place by a conduit several hundred fathoms long, descending into the valley and re-ascending the hill. After deducting the trifling expenses of the building, balances and drums, the cost of keeping up is inconsiderable, certainly not half-a-crown a day.

Of the pumping engines (*Wasserhaltungsmaschine*) the finest is probably that at Schmidt shaft, Helbra, built in 1848, by Luig and Co., at Sterkerade, near Oberhausen. It works by single action, on the Cornish principle, with cataract gear and Harvey's butterfly valves. The pressure of the steam in the 47-inch cylinder is from 15 to 20 *Zoll*



Richards's Hydraulic Balance (*Scale* ($\frac{1}{48}$)).

pounds per square inch; stroke 9 feet in cylinder, 7 feet in shaft. The boilers are cylindrical and consume 30 *Tonnen* (83¼ cwt.) of Emsloh brown coal during the 8 hours in which it is at work. As is well known, brown coal does not give the same amount of caloric as ordinary coal, nor can it be successfully employed in the usual furnaces. It may be useful to sum up the remarks of Bruno Kerl as to the difference between true and brown coal:—"Brown coal gives a brown streak; by dry distillation yields acetic acid; before the blow-pipe continues to burn. True coal gives a black streak; yields ammoniacal water; does not continue to burn. 2·86 lbs. of brown coal yield the same calorific power as 1 lb. of true coal." (*Handbuch der metallurgischen Hüttunkunde.* Since brown coal contains about 14 per cent. of water, and requires a great draught for the purpose of supplying a steady current, and expose the largest surface to the action of the flame, a peculiar arrangement has been adopted of late years in Germany called "step-grates" (*Treppen Röst*). This consists of a triple series of 12 to 15 narrow fire-bars, placed in an inclined plane at the front of the boilers, so as to admit of the freest access of air horizontally; above this is an open hopper on which the coal is piled, so as to fall of itself, by the power of gravity, in proportion as it burns. By such a simple contrivance the combustible undergoes a preliminary roasting and dessication, and the mechanical water is expelled before it comes in contact with the flame, which could not be effected in a common furnace. The space occupied by the fire is about 4 feet square, but the flame plays on the whole lower surface of the boiler, and passes out at the back, and thence up the chimney, which it has been found practically necessary to raise to the height of at least 80 or 100 feet, in order to afford sufficient draught for perfect combustion. Under these circumstances the residuum is a white ash, occasionally with a slight admixture of cinder; there is no fear of the bars getting clogged up with caking substances, though they may often suffer by the presence of iron pyrites. The boiler is generally supplied with water which, having filtered through the gypsum and *Zechstein* limestone, contains in solution a considerable quantity of hydrated sulphate of lime, whence by continued evaporation a coating of gypsum lines the interior, and has to be hammered off from time to time. The condensed steam from the pumping-engine at Schmidt shaft is led to a kind of graduation house (*Gradirhaus*), consisting of a double perpendicular wooden frame, 15 feet high, filled with layers of brushwood, and exposed to the prevailing wind; the whole of the condensed steam is conveyed by a pipe to the summit of this contrivance, and trickles over the brushwood, whence it falls into the reservoir below, to be pumped into the boilers when cold. Only as much water as is lost by the transit has to be raised from the mine, the rest has simply to be pumped to the level of the adit.

At the 81st ventilating shaft the 36 horse-power pumping engine is placed underground, though the boilers are at the surface; the diameter of the cylinder is 3 feet, stroke 9 inches, pressure of steam 35lbs. per square inch. It was built two years ago at Eguld's factory in Berlin.

A remarkable old-fashioned engine, making great noise at each stroke, has been in operation for about 40 years at Maschinen shaft, and is worth a moment's visit in order to appreciate the rapid advance of engineering science during this century. It is 28 horse-power, and burns 60 *Tonnen* (8 tons) of Hollenstedt brown coal in 24 hours, in order to raise the water 7 feet high.

The deeper shafts, such as Schmidt and Bolze shafts, are supplied with man-engines (*Fahr-kunst*) attached to strong vertical beams and guided by chains; they are suspended to the upper angle of an arc of a circle, having a fixed centre, but united by a horizontal connecting-rod to the steam-engine crank. The men only employ the engine for ascending; the stroke being about a fathom, one man stands on the platform while the succeeding miner replaces him at the following stroke. Most of the man-engines are double, two platforms being simultaneously set in motion in contrary directions, the one ascending while the other descends.

Besides the numerous steam and water-engines, powerful underground water-wheels are sometimes employed. In the Maschinen shaft is a wheel 25, feet in diameter, which raises the water to the Glück auf level, the Schlüssel having as yet no outlet.

A detailed section of the copper-slate at Wimmelburg shows:—

Beds over-lying the Copper-slate.

	Prussian feet.	inches.
Gypsum, with superincumbent strata ...		
Zechstein,* bituminous limestone	15	0
Faule, lower bed of the *Zechstein*.........	4	0
Dachklotz, somewhat schistose limestone	0	10

Copper-slate Series, or "Flötz."

	ft.	in.		
Noberge or *Dachberge* (sometimes sub-divided into *Schwartz* and *Grau-berge*), bituminous limestone, and region of "roof-ores" (*Dacherze*)	0	8	1	3
Schieferkopf, "head"...............	0	3		
Kammschale	0	1		
Grobe and *feine* ... *Lette*....................	0	3		

Series under the Copper-slate.

Weissliegendes, very dense white sandstone free from quartz pebbles, with ½ to ¾ inch of "sand-ores" in confined localities, chiefly under Erdmann shaft (Wimmelburg)	4	0
Rothliegendes, the upper portion a very hard conglomerate bed	depth undetermined.	

Although the variety of ores is great, they are chiefly sulphuretted combinations. Thus the cupriferous beds are locally 15 to 16 inches thick; the *Klotz* being removed for convenience sake, gives a height of about 21 to 24 inches to the workings. The lowest bed is soft or semi-indurated; when rubbed with a piece of iron it presents a smooth polished surface; by the fatness of the brown streak thus exhibited the miners judge of its richness in copper ore, as the most careful ocular examination would often fail to show any metalliferous particles; it rather assumes the appearance of fat coal, and may be cut with a knife. This earthy substance, called *Schramm*, is very inconstant and often absent; in other places it is seen above or in the *Lette*, the most important member of the copper-slate formation. Owing to its assuming two distinct physical forms, the *Lette* is divided into fine and coarse (*feine* and *grobe Lette*), the former, or lower variety, is a blackish slaty rock, pervaded parallel to the planes of stratification with an infinite number of minute particles of copper ore, either bright yellow copper pyrites, gray or purple copper, copper indigo, or cupriferous iron pyrites. In section, even when freshly cut, these are often only rendered visible in the rays of the sun, or by the use of a lens, but by a blow on the edge the stone is perceived to have a foliated structure, each portion as it is detached from the rest is dotted over with minute metalliferous faces. The *grobe Lette* differs from the former simply in that the particles of ore are larger, more concentrated, and easily distinguished by the naked eye. It often contains several thin plates of "horse flesh ore" (*Buntkupfererz*) and vitreous copper (*Kupferglanz*), ⅛th to ¼ inch in thickness between the planes

* *Zeche* is a portion of a mine; a *Zechenhaus* is the little building where the miners meet every morning to pray, and the captains call over the roll before they descend to their work. These erections being generally situated on the gypsum, or limestone, have given origin to the name *Zechstein.*

of stratification, also thinner streaks of copper pyrites (*Kupferkies*).

The *Kammschale* is immediately distinguished by the delicate white hair-like streaks which alternate with the black ground; these markings are not continuous, but about an inch long, with a small interval between each; they are chiefly composed of sulphur, which I regard as due to the chemical decomposition of some sulphide originally contained in it, for a preponderance of these streaks is the best sign that it is too poor in copper to be smelted; other indications of its worthlessness, are its brown colour and earthy, dull-gray streak when rubbed. The *Schieferkopf* is a more uniform slaty bed, without the delicate metalliferous particles of the *Lette* or the streakings of the *Kammschale;* it frequently contains ore between its layers. The presence of ore in the *Dachberge* is in the highest degree uncertain, but this has its advantages—in that, when found, it generally consists of concentrated masses of purple copper ore, as large as a bean, in the midst of very bituminous limestone, which breaks off in masses, easily separating from the bed above, and serving as a flux. When the rock has a brownish tint it is distinguished as *Grauberge*, and when black, as *Schwartzberge.* These are pretty nearly synonymous, except that by the word *Dachberge* it is supposed to cover the ores as a roof; the ores obtained from this roof are termed *Dacherze.* The only distinction observable between the *Dachklotz* and superincumbent *Dach* or *Faule* is, that the *Klotz* has a very undulating though smooth surface, and forms the transition to the beds above. Being in most cases continuous, each bed can be blasted separately; it is only on reaching the *Zechstein* limestone that we find 12 to 20 feet of more compact bituminous rock.

(*To be continued.*)

EXAMINATION PAPERS, 1861.

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in April and May last:—

ARITHMETIC.

THREE HOURS ALLOWED.

1. Find by Practice, the cost of 365½ yds. at 13s. 5¾d. a yard.

2. What is the rent of a farm which contains 315 ac. 3 ro. 7 per. at £1 16s. 8d. an acre?

3. A pound of mould candles costs 8d., and contains 6 candles; a pound of dips costs 6½d., and contains 10 candles, 1 mould will burn as long as 2 dips, viz., 6 hours, which are the more economical?

4. A owes B for 27 yds. 3 qrs. 3 nls. of cloth at £1 3s. 6d. per yd., and B owes A for 61 English ells 3 qrs. 2 nls. of silk at 7s. per English ell. What is the balance of the account, and in whose favour?

5. The gas consumed by one burner for 56 days costs £2 7s. 6½d. What will the gas of another burner cost for 40 days which consumes only $\frac{23}{40}$ of the former?

6. A workman was hired for 40 days on condition of receiving 1s. 8d. for each day he worked, and paying 10d. for his board each day he was not employed. He received £2 1s. 8d. Find the number of days he was employed.

7. If 24·25 francs be equivalent to £1, express £24 10s. in francs and 97 francs in English money.

8 When a rent has been reduced ⅕th, a rate of 16d. in the pound amounts to £18. What is the rent?

9. If A can do a certain work in 2⅔ days, and B can do ⅗ of it in 4½ days, in what time can it be done by both working together?

10. From London to Brighton is 50½ miles. In what time will a train perform the journey at the rate of 990 yds. per minute, allowing $\frac{5}{24}$ of an hour for stoppages?

11. If 24 men in 2½ days of 12½ hours, dig a trench 139·75 yards long, 4½ yards wide, and 2½ yards deep, what length of trench will 90 men dig in 4⅕ days of 9⅔ hours; the trench being 4⅞ yards wide and 3⅓ yards deep?

12. A candidate must get ⅙ of the whole marks to pass an examination. He answers half the questions, but to ⅚ of his answers he gets on an average only ⅖ of the marks, and thus has 25 too few to pass. How many does he get altogether?

13. The floor of a room is 25 feet 7 inches by 15 feet 5 inches, and the height is 7 feet 4 inches; what will be the expense of papering the walls at 1d. a square yard, and of whitewashing the ceiling at 2d. a square yard; and how many persons may sleep in it, allowing 300 cubic feet for each?

14. A person pays income-tax for 9 months in the year, at the rate of 5d. in the £, and for the remainder of the year at 7d. in the £; what should be his gross annual income to leave him a surplus of £2,000?

15. A person invests £3,412 10s. in the Three per Cents. at 91; he sells out £2,500 stock when they have risen to 93½, and the remainder when they have fallen to 85. How much does he gain or lose by the transaction? If he invests the produce at 4½ per cent. stock par, what is the difference in his income?

16. Butchers' meat sells at one time for 10s. 7½d. per stone of 14lbs.; and at another time for 4s. 5d. per stone; what is the rate per cent. of decrease?

17. Find the difference between the compound interest on £840 for four years at 5 per cent., and for five years at 4 per cent., payable in each case half-yearly.

18. What is the gain per cent. in buying goods at £27 per ton with four months' credit, and selling them for ready money one month after purchase at £29 per ton?

19. If a cistern 12 feet long, 6 feet wide, and 2½ feet deep, is filled by 3 equal pipes in two hours, how long would it take to fill a cistern containing a thousand gallons by two such pipes, supposing the weight of a gallon of water to be 10 lbs., and that of a cubic inch of water to be 250·5 grains?

20. In a match of cricket, a side of 11 made a certain number of runs; one obtained ⅛th of the number, each of two others $\frac{1}{10}$th, and each of three others $\frac{1}{20}$; the rest made up between them 126 the remainder of the score, and four of these last scored each 5 times as many as the other. What was the whole number of runs, and the score of each player

BOOK-KEEPING BY DOUBLE ENTRY.

THREE HOURS ALLOWED.

1. In what consists the distinction between double and single entry?

2. Are all errors to which a book-keeper is liable preventable or discoverable, if his books be kept by double entry?

NOTE.—State reasons for the answer to this question.

3. State the use of the Journal.

4. What is the use of the Ledger?

5. Write out in proper technical form and language the Journal and Ledger entries of the following transactions:—

Bought 200 tons of pig iron from the Carron Company for	£850	
Accepted Carron Company's draft for .		£850
Sold to W. Jones, 100 tons of pig iron for . .	£500	
Received of W. Jones his acceptance for .	400	
And Cash . . .	100	

6. What is the nature of the items which enter into the composition of a profit and loss account, and what does its result exhibit?

7. What should a Balance Sheet exhibit?

8. Journalise and post in proper technical form and language the following imaginary facts and transactions,

and draw out from the Ledger a trial balance, a balance sheet, and a profit and loss account.

On the 1st January, 1861, Charles Stuart ascertained that the state of his affairs was as follows:—

ASSETS.

Pig iron, 400 tons at £4 per ton	£1,600
Balance of cash in hand . .	1,400
O. Cromwell's acceptance due 10th January . . .	500

DEBTS.

C. Stuart's acceptance due 25th Jan.	570

Transactions subsequently to 1st Jan. 1861.

1861.		£	s.	d.
Jan. 4.	Purchased of Carron Company 200 tons of pig iron .	900		
,, 5.	Sold to J. Locke, 300 tons pig iron	1,400		
,,	Received of J. Locke, his acceptance due 8th March .	1,000		
,,	Received cash of J. Locke	200		
,, 10.	Cash paid, freight and insurance, on 200 tons of pig iron .	45		
,, 11.	O. Cromwell's acceptance, due 10th inst., returned dishonoured .	500		
,,	Cash paid Notarial charges thereon	1	10	0
,, 12.	Sold to J. Locke, 200 tons pig-iron	1,000	0	0
Jan. 15.	Paid Cash to the Carron Company	900	0	0
,, 17.	Discounted J. Locke's acceptance for £1,000. . . .			
,,	Received Cash proceeds of Bill .	992	10	0
,,	Discount charged thereon .	7	10	0
,, 18.	Received of J. Locke his accepance due 4th April . .	800	0	0
,, 21.	Purchased of C. J. Mare and Co., 2,000 tons iron rails @ £5 10s.	11,000	0	0
,, 23.	Consigned to Pernambuco, on my own account and risk, to the care of Ewart and Co., of that place, 1,000 tons iron rails, at cost price of £5 10s. per ton .	5,500	0	0
,,	Received of Vernon and Co., of London, by way of advance on the above shipment, their acceptance at four months' date .	3,000	0	0
,, 24.	Accepted C. J. Mare and Co.'s draft on me at 3 months' date .	6,000	0	0
,,	Paid cash to C. J. Mare and Co., on account . . .	2,500	0	0
,,	Cash paid, freight and charges on iron rails consigned to Pernambuco	750	0	0
,, 25.	Cash paid, my acceptance due this day . . .	570	0	0
,,	Cash paid J. Mackenzie on my private account. . .	160	0	0
,,	Sold to G. Stephenson, 200 tons iron rails, @ £6 per ton .	1,200	0	0
,,	Received of G. Stephenson, his acceptance due 28th March .	1,000	0	0
,, 26.	Sold to J. Locke, 600 tons iron rails @ £6 per ton . .	3,600	0	0
,, 28.	Received cash of J. Locke, on account.	2,800	0	0
,,	Cash received from O. Cromwell on account of his acceptance due 10th instant, returned dishonoured	200	0	0
,, 31.	Cash paid my clerk 1 months' salary to date . . .	25	0	0
,,	Interest accrued to this date, viz., one month on capital account .	11	5	0
	Stock on hand 31st January, viz.,			
	Pig-iron at £4 . . .	400	0	0
	Iron rails at £5 10s. . .	1,100	0	0
	Amounts due and unpaid 31st January, viz.:—			
	To Wm. Johnson, 1 mos'. rent of office and warehouse . .	13	6	8
	To J. Howard, for stationery supplied	6	10	0

NOTA BENE.—Candidates who reply to No. 8 need not reply No. 5. but *satisfactory answering* in No. 8 will be deemed an indispensable condition to a high degree of excellence.

ALGEBRA.

THREE HOURS ALLOWED.

A

1. Find the value of $6x^4 - 5x^3 - 4x^2 + x - 96$ when $x = \frac{3}{2}$, and of $6x^4 - 5ax^3 - 4a^2x^2 + a^3x - 96a^4$ when $x = \frac{3a}{2}$.

2. Multiply $a^2 + b^2 + c^2 - ab - ac - bc$ by $a + b + c$.

3. Divide $x^7 - 4x^5 - x^2 + 4$ by $x^2 + x - 2$.

4. If $ax^5 + bx^4 + cx^3 + dx^2 + ex + f = X$, and $a + c + e = b + d + f$, prove that X will divide out by $x + 1$ without leaving any remainder.

5. Find the greatest common measure of $x^3 + a^3$, and $x^2 - 2ax - 3a^2$; and reduce the fraction $\dfrac{1 + x^3}{+ 2x^2 + x^3}$ to its lowest terms.

6. Solve the equations

$$\frac{3x - 8}{5} + \frac{7x - 37}{8} = \frac{x + 1}{4} + 7.$$

$$\left.\begin{aligned} x + 27 + 3z &= 11 \\ y + 22 + 3x &= 17 \\ z + 22 + 3y &= 8 \end{aligned}\right\}$$

7. Suppose $\left.\begin{aligned} 3x + 5y + 9z &= 18 \\ 4x + 7y + 13z &= 70 \\ 5x + 8y + 14z &= c \end{aligned}\right\}$

Ascertain if it is possible to satisfy all these equations at once for *every* value of c, and if not, what c must be when the three equations do admit of being satisfied by the same values of x, y, z.

8. If $\frac{a}{b} = \frac{c}{d}$ prove that $\frac{a + b}{a - b} = \frac{c + d}{c - d}$

B.

9. Find the sum of an arithmetical series whose first term is 110, common difference 13, and the number of terms 1,000.

10. Find the square root of
$1 - 6x + 15x^2 - 20x^3 + 15x^4 - 6x^5 + x^6$.

11. Solve the equations $\left.\begin{aligned} x^2 + xy + y^2 &= 49 \\ 2x - y &= 7 \end{aligned}\right\} (1.)$

$\left.\begin{aligned} x^2 + xy &= a^2 \\ y^2 + xy &= b^2 \end{aligned}\right\} (2.)$

12. A waterman can row five miles with the tide in his favour in three-quarters of an hour, but requires an hour and a half to row back as far against the tide, when it is only half as strong as before, how long would he take to perform the same distance if there were no tide at all?

13. Prove that the sum of the squares of two unequal numbers is always greater than the double of their product, and the sum of the squares of three unequal numbers always greater than the sum of the three products that may be obtained by combining them two and two together.

GEOMETRY.

THREE HOURS ALLOWED.

1. The angles at the base of an isosceles triangle are equal to one another; and if the equal sides be produced, the angles on the other side of the base shall be equal.

2. Make a triangle of which the sides shall be equal to three given straight lines.

What condition must exist between the three lines? Show that the construction fails if this be not observed.

3. To a given straight line apply a parallelogram which shall be equal to a given triangle, and have one of its angles equal to a given rectilineal angle.

4. Divide a given straight line into two parts, so that the rectangle contained by the whole and one of the parts shall be equal to the square of the other part.

5. A segment of a circle being given, describe the circle of which it is a segment.

6. If two straight lines cut one another within a circle, one of them passing through the centre, prove that the rectangle contained by the segments of one of them is equal to the rectangle contained by the segments of the other.

7. Describe an isosceles triangle, having each of the angles at the base double of the third angle.

What is the ratio of the radii of the two circles in the figure?

8. Triangles and parallelograms which have the same altitude are to one another as their bases.

9. If four straight lines be proportionals, the similar rectilinear figures similarly described upon them shall be proportionals.

10. If a straight line stand at right angles to each of two straight lines in the point of their intersection, it shall be also at right angles to the plane which passes through them, *i.e.* to the plane in which they are.

11. If a solid angle be contained by three plane angles, any two of them shall be greater than the third.

12. Circles are to one another as the squares of their diameters.

PROBLEMS.

1. Find a point in the base of a triangle, such that if perpendiculars be drawn from it upon the sides their sum shall be equal to a given line.

2. Two chords of a circle are drawn, so as to touch a concentric circle, the trapezium being completed, show (by means of the 3rd Book only, without assuming the properties of similar triangles) that the diagonals are bisected by the line joining the middle points of the chords.

3. If a circle roll within another of twice its size, any point in its circumference will trace out a straight line.

4. Describe a circle which shall touch a straight line at a given point, and bisect the circumference of a given circle.

5. Trisect a parallelogram by straight lines drawn from one of its angular points.

6. In a given circle inscribe three equal circles, touching each other, and the given circle.

7. Draw a line from the vertex of a triangle to the base, which shall be a mean proportional between the whole base and one segment.

8. Through a given point draw a circle touching two given circles.

9. The six planes bisecting the dihedral angles of a triangular pyramid, meet in a point.

MENSURATION.

THREE HOURS ALLOWED.

1. What is the arithmetical measure of (1) a line, (2) an area, (3) a solid, and (4) an angle?

2. Find the number of feet and inches in the two rectangular areas which are respectively:—

(A) 45 feet 7 inches by 37 feet 5 inches,
(B) 10 feet 5¾ inches by 7 feet 6¼ inches,

by the method of "cross multiplication;" and verify your results by some other method.

3. If the sides of an isosceles triangle be given, what will be the angle between them—

(A) when the area of the triangle is the greatest possible?
(B) when it is half this size?

4. Find the area of the field ABCD, when the diagonal AC = 650 links, the perpendicular from B upon AC = 304, CD = 450, and DA = 800?

5. What will be the expense of covering a roof at £2 3s. 4d. per square, the length of the roof being 39 feet 6 inches, and the girth 26 feet 5 inches?

6. Required the expense of glazing an oval window 3 feet 6 inches by 2 feet 7 inches, at 2s. 1½d. per square foot.

7. Find the whole quantity of timber contained in four blocks, each of which is 16 ft. long, and their other dimensions are respectively 4 ft. 7 in. by 3 ft. 4 in., 3 ft. 5 in. by 2 ft. 8 in., 3 ft. 4 in. by 3 ft. 5 in., and 2 ft. 8 in. by 4 ft. 7 in.

8. Indicate some method of finding the ratio which the circumference of a circle bears to its diameter.

9. From a point without an enclosed circular area two lines are drawn, one of which touches the circle and the other is the shortest which can be drawn to reach the circle; the former is 8 chains, and the latter 4 chains in length; find the diameter and area of the enclosure.

10. Compare the values of two coins of the same metal:—

(A) when their diameters are in the ratio of 2 to 3,
(B) when their surfaces are in the ratio of 2 to 3, supposing them to be of the same thickness in each case.
(C) when they are *similar*, and their linear dimensions are as 2 to 3.

11. How many medals can be made from a cubic inch of metal, each medal being 1-10th of an inch thick and 3-4ths of an inch in diameter? What will be the weight of each medal if its specific gravity be 8·8?

12. If the surface of a cone when unwrapped becomes a semicircle, what is the angle of the cone?

13. Find the solid content of the segment of a sphere of which the height is 9 inches and the radius of the base 10 inches?

14. A cone and cylinder of the same altitude and on the same base contain, in their curved surfaces, 120 square inches each; find the area of the base.

15. Find the weight of hay in a stack of the following dimensions:—The circumference at the base is 40 feet, at the eaves 53 feet 4 inches; the height of the eaves is 14 feet, and the height of the top 22 feet; the upper part is conical, and the lower is the frustum of a cone. Each cubic yard is supposed to weigh 200 lbs.

16. If a cubical vessel be filled with water, and then turned about one of its corners in such a way that its four sides are always equally inclined towards the horizon, in in what position will it be when five-sixths of the water is poured out?

CONIC SECTIONS.

THREE HOURS ALLOWED.

SECTION I.—GEOMETRICAL CONICS.

1. Define conic section, focus, directrix, vertex, centre, diameter, tangent; and prove that the tangent of a hyperbola bisects the angle between the focal distances.

2. Prove that the subtangent of the parabola is equal to twice the abscissa; (NT = 2. AN); and that this theorem is true whatever is the diameter, if NP is the corresponding ordinate.

3. If the tangent to an ellipse at the point P meets the directrix in the point Q, and if S is the focus corresponding to the directrix on which Q is, then SQ is perpendicular to SP. Hence, also, prove that the tangents to an

ellipse at the extremities of a focal chord meet in the directrix.

4. A is the vertex of a parabola, S is the focus, P is a point on the curve, and PN is the ordinate of the principal axis; show that $PN^2 = 4$ AS. AN; and that the perpendicular from S on a tangent intersects that tangent in the tangent to the curve at the point A.

5. What are asymptotes to a hyperbola? Show that the area of the triangle contained between the asymptotes and a tangent to the curve is constant.

6. Define conjugate axes of an ellipse. CP and CD are conjugate semi-axes, and PM and DN are the corresponding ordinates; show that

$$(1.)\ CM^2 + CN^2 = CA^2$$
$$(2.)\ CP^2 + CD^2 = CA^2 + CB^2$$

7. The parameter of any diameter of a parabola is equal to four times the focal distance.

8. Explain all the methods you know for describing by continuous motion (1) a parabola; (2) an ellipse. Which is best adapted for a mechanical instrument?

9. If P is a point on a hyperbola, and CD is conjugate to CP, and S and H are the foci, then $SP \times HP = CD^2$.

10. Prove that the section of a cone, made by a plane which cuts both slant sides, is an ellipse; and determine its principal axis, directrix, and focus in terms of the given elements of the cone and the plane of section.

11. Determine in reference to a parabola, the position of the plane in which it is projected into a circle; and hereby prove that the "area of the parabola" is two-thirds of the circumscribed rectangle.

Section II.—Algebraical Conics.

12. Find the equation to a straight line passing through the point of intersection of the two lines

$$ax + by + c = 0$$
$$a'x + b'y + c' = 0,$$

and equally inclined to the co-ordinate axes. Is the result the same whatever be the angle between the co-ordinate axes?

13. Prove that the locus of a point, the perpendicular distances of which from two given straight lines are in a given ratio, is also a straight line.

14. Determine the co-ordinates of the points in which the straight line $Ax + By + C = 0$ meets the circle $x^2 + y^2 = r^2$. Hence deduce the conditions that the line should touch the circle, and geometrically interpret the result.

15. Find the equation to the circle passing through the points (1, 2), (2, 3), (− 2, 5), and determine its radius and the co-ordinates of its centre.

16. Find the equation to the normal of a parabola at a given point, and prove that from any point *generally* three normals can be drawn to a parabola.

17. Prove analytically the theorems contained in questions 2, 5, 6, 7, 9, of the preceding section.

18. Examine and trace the lines represented by the following equations.

$$(1.)\ x^2 - y^2 = 0$$
$$(2.)\ y^2 + 2xy + x^2 + y - 3x + 1 = 0$$
$$(3.)\ 3x^2 + 2xy + 3y^2 - 16x + 23 = 0$$

19. Show that the equation of the second degree may, by change of origin and axes, be reduced to the form $Ax^2 + By^2 + F = 0$, if the curves which it represents are central.

(*To be continued.*)

EXHIBITION OF 1862, AND MECHANICS' INSTITUTIONS.

Travelling Club.

The Committee of the Basingstoke Mechanics' Institution, with a view to enable the working classes of the town and neighbourhood to provide, by small weekly payments, the means of going to London to visit the Great Exhibition proposed to be held during the summer of 1862, have resolved to establish an "Exhibition Travelling Fund Club" in connection with the Institute, subject to the following rules, viz.:—

1. That the General Committee of the Mechanics' Institute, with such other members as they may appoint, be considered as the committee for organising and carrying out all necessary arrangements of the "Exhibition Travelling Fund."

2. That the full deposit of each member shall not be less than 5s., to be paid by weekly contributions of not less than one penny. Each payment to be entered on the member's "subscription card" at the time paid.

3. That two members of the Committee shall attend at the Mechanics' Institute every Monday evening, from eight to nine o'clock, to receive subscriptions, and give any information required.

4. That the weekly subscriptions shall be considered to commence on Monday, June 3rd, 1861, at the hours stated in Rule 3, and shall terminate on Monday, June 2nd, 1862.

5. Any person becoming a depositor at any time after the first week, shall pay up the arrears then due.

6. Any member leaving the town, or being unable from sickness, or other reasonable cause, to continue his or her deposits, shall be entitled to receive the amount he or she has paid in, subject to a small deduction (to be decided by the Committee) towards the expense of printing and other charges.

7. That none but subscribing members to the "Exhibition Travelling Fund Club" shall be allowed to participate in any special advantages obtained by the Committee from the railway authorities or others for the benefit of such "Travelling Fund Club;" neither shall the tickets issued by the Committee be made available for any other purpose than visiting the proposed Exhibition.

DIVING APPARATUS.

The following is extracted from the *Times*:—

"The experiments with the diving apparatus* on the plan suggested by Mr. White, surgeon, of Finchley, were resumed on Wednesday, the 3rd of July, at Portsmouth Dockyard, in the presence of the officials of the establishment by order of the Commissioners of the Admiralty. Mr. White's invention consists of a cylinder, in lieu of the ordinary diving dress, and of two vulcanized india-rubber tubes in lieu of an air-pump for the supply of air. The tubes are used by Mr. White both with the customary diving dress and helmet when the work to be done lies on the ground, and with the cylinder when the latter is used for cleaning the bottoms of iron ships. The cylinder in use was roughly formed of wood, and hooped with iron. It leaked so much that it could be kept under water no length of time. The cylinder is constructed of sufficient size to contain a man, and with room enough to give play to his shoulders, his arms working free outside through holes in the case fitted with vulcanised india-rubber sleeves. These, however, can be readily dispensed with if the operation to be performed is simply the scraping of the vessel's bottom, a scraper being fitted in front of the cylinder with its handle working from the interior through an india-rubber valve. The top of the cylinder is closed by a cap, in which are glass lights to enable the man to see his work, and which is fastened by india-rubber springs and hooks from the inside. A brass nut screws into the centre of the cylinder cap through which pass two india-rubber tubes for the supply of fresh air and the discharge of the heated air from the cylinder. The supply pipe is fitted with a mouthpiece. By a simple

* This apparatus was shown in the Society's last Exhibition of Inventions, and was numbered 96 in the Catalogue.

contrivance it is fastened over the mouth of the man inside the cylinder, who thus draws each breath directly through the tube from the surface of the water overhead. Each respiration of the man under the ship's bottom can be counted by those in charge of the tube ends by the working of a slight valve at the end of the supply tube, the stoppage of which will at once indicate that something is wrong below. There are other means of safety. Through the two tubes which supply the fresh and discharge the heated air, conversation to any extent may be kept up between the man at work below and those who are in attendance upon him above, by which means he also directs their movement of the cylinder to any portion of the ship's bottom to which his work may require him to go. In the event of any sudden and unforeseen danger, when there is no time to communicate by speech through the tube, the man can cast loose the springs of the cylinder cap, and, throwing it off, rise to the surface of the water in his inflated india-rubber life-jacket. Although the trial was necessarily short, owing to the leakage of the cylinder, it was quite sufficient to prove the soundness of the principle, and its adaptability, at a wonderfully cheap rate, for cleansing the bottoms of iron ships when afloat and without the means of docking."

Home Correspondence.

LEEDS STUDENTS' UNION.

Sir,—The Leeds Students' Union is a society composed of those persons who have obtained certificates at the Society of Arts' Examinations, in connection with the Leeds Mechanics' Institute, the Young Men's Christian Institute, and the Church Institute, and they are anxious that the attention of the Council of the Society of Arts, and the representatives of Institutions, should be directed to the scheme of Examinations, with a view to its further development.

The candidates who compose this union, while expressing their high appreciation of the plan adopted by the Council of the Society of Arts, and, acknowledging the great value it has been to each of them, believe that by the introduction of one or two new features, the scheme of Examinations may not only be made more useful and important, but more universally popular as a means of promoting the education of the people.

The first suggestion is, that the Council should award, in addition to prizes and certificates, medals, as a higher form of reward. Those who are familiar with the working of the Society's Examinations will be aware that there are many candidates who offer themselves for three or four years in succession, and who manage, by persevering industry, to take a first rank in a variety of subjects. To such persons the obtaining of first-class certificates, when they hold perhaps six or nine, will be of little interest. They will naturally desire that something of still higher value should then be placed before them to strive for and earn. Now, I feel assured that a large number of candidates in this district would regard it as a matter of the deepest moment to the complete success of the Society of Arts scheme of Examinations, if it could present before candidates something that would induce students of evening classes to pursue step by step such a curriculum as would eventually lead them to matriculate at the universities of London or Dublin.

The Society of Arts would then have bridged over, for the industrious and middle classes, all the difficulties at present apparent in the educational appliances of the times, and would have before it for several years to come most efficient machinery, not only for encouraging the cultivation of that knowledge which has reference to the useful arts, but for giving an impetus to the cause of learning in general. The following details are suggested:—

That there should be two classes of medals. A silver medal to be given to those who obtain five first-class certificates in the course of two years; and a gold medal to such as pass with proficiency through a certain number of subjects at one Examination.

The Students' Union would also ask your favourable attention to a suggestion made at the last Conference with regard to situations in the Government dockyards, &c., for those candidates who obtain first prizes, and are following occupations of a mechanical nature. Amongst the first prizemen for several years you will find that mechanics have frequently been found. To such the Council have offered nominations to Government clerkships. In most cases these have been declined, not because the candidates did not want promotion of some kind, but because the occupation of a Government clerk was entirely foreign to their taste and mechanical ability. Had the Council offered a situation in a first-rate engineering establishment of acknowledged repute, or in a Government naval factory, such a post, though hard work had been connected with it, would have proved a much greater boon, and a mathematical prizeman in such a position might render, possibly, eventually, good service both to himself and his country, where encouragement and scope was given to his inventive talent.

I can only say, if you will kindly direct the notice of the Council to these matters, you will confer a great obligation upon the young men of Leeds.

I am, &c.,

C. S. SPENCE,

Hon. Sec. for Working Men's Institute, and Durham University Middle Class Examinations.

Proceedings of Institutions.

Barnet Institute.—The twelfth annual report for the year 1860-1, congratulates the members on its continued and increasing prosperity. The number of members now on the books is 180. Of these 30 have been elected during the past year. Between October 23rd, and April 10th, 1861, more than 20 lectures were delivered. In two or three instances the travelling expenses were paid, but with the exception of a trifling outlay on this account, the lectures were entirely gratuitous. The lectures have been listened to by large and attentive audiences, and there can be no doubt that their delivery, (apart from the instruction thereby conveyed), has been productive of much good feeling amongst the various classes of persons who were assembled on these occasions in the Town Hall. The Committee are most desirous that classes should be formed in connection with the Institute, for instruction in various branches of education. An arithmetic class has been in operation during the past year. The library contains various useful works, but it cannot be said to be in a satisfactory state, and to render it sufficiently comprehensive would require an amount of funds which the Committee can hardly hope at any time to possess. They therefore earnestly invite the friends of the Institute to favour them, as opportunity may occur, with donations of books. The funds are in a satisfactory condition, the receipts having amounted to £63 0s. 10½d.; and the expenditure £51 5s. 9½d.; leaving a balance in hand of £11 15s. 1d.

Chippenham Literary and Scientific Institution.—The last annual report of this Institution speaks of its continued increase and success. The number of subscribers at present is 29, at an annual subscription of £1, and 60 at 10s., being a small increase on the previous year. The library has received the addition, during the past year, of 150 volumes, and now contains 669 volumes; and the reading-room is well supplied with newspapers and periodicals. The thanks of the Institution are due to the President, G. P. Scrope, Esq., M.P., who kindly forwarded a donation of £5, which the Committee expended

in the purchase of Alison's History of Europe, 20 vols., and Napier's Peninsular War, 6 vols. The Institution has been indebted for lectures to the following clergymen and gentlemen :—The Rev. J. Wilkinson, Rector of Broughton Gifford, "On Shakespeare." The Rev. A. Headly, Rector of Hardenhuish, "On the attempted Invasion of England by the Spaniards in 1588." H. A. Merewether, Esq., "On Ancient and Modern Locomotion." M. H. Marsh, Esq., M.P., "On Australia." Capt. Hans Busk, of the Victoria Rifles, delivered a lecture on "Rifles and Rifle Shooting," which, however, was not so numerously attended as the importance of the subject demanded. The statement of accounts shows that the receipts have amounted to £74 16s. 9d., and that there is a balance in the hands of the treasurer of £2 5s. 8d.

To Correspondents.

Erratum.—In last number of *Journal*, p. 599, col. 2, line 47, for "Westow" read "Wistow;" and p. 600, col. 1, lines 20, 22, and 26, for "mask" read "wash."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED

[*From Gazette, July 5th*, 1861.]

Dated 25th February, 1861.

479. W. Dray, Farningham, Kent—Imp. in fire-places.

Dated 7th June, 1861.

1454. W. A. Sands, New York—Imp. in the construction or manufacture of sails for ships or other vessels.

Dated 17th June, 1861.

1456. J. Lewis, 51, High-street, Bloomsbury—Improved machinery for cutting and boring wood and other substances.
1548. T. Routledge, Eynsham Mills, near Oxford—Imp. in the manufacture of paper.
1549. W. Clark, 53, Chancery-lane—Imp. in the manufacture of letters, designs, and other articles of mica variously coloured or metallized. (A com.)
1550. W. Clark, 53, Chancery-lane—Imp. in batteries and in breech-loading ordnance and projectiles for the same. (A com.)

Dated 18th June, 1861.

1554. J. Banks, Salisbury-street, Adelphi—Imp. in electro-magnetic telegraph printing apparatus or marking instruments.
1556. F. Ziffer, Vienna—Certain imp. in carding engines for carding cotton and other fibrous substances.
1564. J. A. Limbert, Woodville-terrace, Gravesend—Imp. in mounting and fitting ships guns and other ordnance.
1566. M. McKay, Birmingham—An imp. or imps. in the manufacture of cements or adhesive solutions for joining or connecting together surfaces or articles of leather, wood, paper, or other similar articles.
1570. J. Dixon, Gallowgate Works, Newcastle-on-Tyne—Imp. in water-closets and cocks used therewith.

Dated 19th June, 1861.

1574. W. Clark, 53, Chancery-lane—Imp. in umbrellas and parasols. (A com.)
1576. P. Schafer and F. Schafer, Golden square—Imp. in travelling bags or cases.
1578. J. Faulding, 340, Euston-road—Imp. in locomotive engines.
1580. J. F. Williams, 10, Queen-square, Middlesex—Imp. in compounds of india-rubber and gutta-percha with other substances.
1582. J. Cullen, North London Railway, Bow—Imp. in preserving wood and iron.

Dated 20th June, 1861.

1584. J. Fletcher and J. W. Fuller, Salford, Lancashire—Certain imp. in machines for planing, boring, and turning.
1588. C. Stevens, 31, Charing-cross—Imp. in smoke-consuming furnaces. (A com.)
1592. C. Hodgson, Ballard Rathdrum, Wicklow—Imp. in the manufacture of fuel from peat and in apparatus employed therein, parts of which are applicable to the moulding of bricks, tiles, and other like materials.
1594. J. H. Bartholf, New Oxford-street—Imp. in the construction of children's nursery chairs, and in apparatus for use in combination with the same. (A com.)

Dated 21st June, 1861.

1596. G. Turner, Rose-terrace, Brompton—Imp. in apparatus for beating eggs and for mixing or agitating other fluids, compounds, or matters.
1597. J. S. Wright, Birmingham—Imp. in reels or spools.
1599. T. R. Harding, Leeds—Imp. in the pointing of steel or other wire for the teeth of cards and in setting and fixing such or similar teeth, into sheets or fillets, which imps. are applicable to the pins for hackles and gills and in part to the pointing of needles.
1600. W. F. Henson, 15, New Cavendish-street, Portland-place—Imp. in the manufacture of floor-cloth and in the means of ornamenting the same.
1601. W. Hobson, Ellesmere-road, Sheffield—Imp. in steam hammers.
1603. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the reproduction of forms of objects applicable to the production of printing surfaces. (A com.)

Dated 22nd June, 1861.

1605. P. H. A. C. Sapia, Paris—Imp. in instruments for measuring angles and distances.
1607. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the manufacture of floor tiles and paving blocks. (A com.)
1609. R. Ormerod, Manchester—Certain imp. in the manufacture of ornamental or fancy ribbons and in the manufacture or apparatus connected therewith.
1610. R. Russell, Sheffield—An improved valve to regulate the passage of fluids.
1611. J. S. McArdle, Galway, Ireland—Imp. in the treatment of sea weeds for the purpose of obtaining therefrom certain valuable products.

Dated 24th June, 1861.

1616. R. Howson, Middlesbro'-on-Tees—Imp. in barometers.

Dated 25th June, 1861.

1622. J. Brown, Newport, Monmouthshire—An imp. in the manufacture of iron.
1624. C. Stevens, 31, Charing-cross—An improved noseband for stopping runaway horses. (A com.)
1626. A. Sacré, Brussels—Imp. in machinery for preparing and spinning flax or other fibrous matters.

Dated 26th June, 1861.

1630. W. Holland, Warwick—An imp. or imps. in suspending and raising and lowering window sashes.
1632. E. Abbotts, Birmingham—Imp. in fastenings for jewellery or other articles.

Patents Sealed.

[*From Gazette, July 5th*, 1861.]

July 5th.

48. P. E. Chassang.
49. G. Hallett and J. Stenhouse.
50. J. J. Welch.
58. C. N. Leroy.
59. W. E. Gedge.
94. H. Matheson.
342. W. E. Newton.
414. A. Turner.
956. A. V. Newton.

[*From Gazette, July 9th*, 1861.]

July 9th.

3096. E. Barlow, J. Newhouse, and F. Hamilton.
64. C. Newsome.
66. J. Conry.
70. C. Senior.
72. H. T. Hooper and W. Gerrans.
78. M. C. E. Page.
79. T. T. Chellingworth and J. Thurlow.
81. H. Pawson.
83. N. Ager.
89. G. Whight.
91. J. Charlton.
92. Hon. W. E. FitzMaurice.
97. C. A. Girard.
99. C. Brush.
100. J. Baldwin, jun., C. Wood, and J. Crossley.
104. J. Horsey.
122. H. Sagar.
125. J. Reading.
135. W. Clark.
136. E. Jullien.
137. M. Henry.
139. J. Townsend & J. Walker.
140. E. Argent.
166. J. B. Pascal.
189. H. Henderson.
215. G. Hallett and J. Stenhouse.
317. T. Banks and T. Morgan.
451. C. Eyland.
703. L. L. Tower.
971. J. P. Schenkl.
977. M. Smith.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, July 5th*, 1861.]

June 2nd.

1495. S. Lees and J. Jaques.
1499. J. Chisholm.
1502. J. G. Jennings.
1504. J. G. Jennings and J. Lovegrove.

July 3rd.

1497. T. Restell.
1509. J. Hodgkinson.

[*From Gazette, July 9th*, 1861.]

July 4th.

1507. R. A. Brooman.

July 5th.

1510. T. Woolner.
1529. A. W. Sleigh.

July 6th.

1542. M. Scott.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, July 5th*, 1861.]

July 3rd.

1469. D. Bowlas.
1484. J. Lamb.

[*From Gazette, July 9th*, 1861.]

July 4th.

1491. W. Pole.

July 5th.

1485. W. N. Nicholson.

Journal of the Society of Arts.

FRIDAY, JULY 19, 1861.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £425,200, have been attached to the Deed.

GUARANTEE FUND FOR THE EXHIBITION OF 1862.

The following additions have been made since the announcement in the *Journal* for July 5:—

*** *The names marked with an asterisk are those of Members of the Society of Arts.*

NAMES.	AMOUNT.	REPRESENTING THE OBJECTS OF THE SOCIETY—ARTS, MANUFACTURES, AND COMMERCE.
*W. H. Cremer, 27, New Bond-street, W.	£250	Arts.
*Nathaniel Grew, 8, New Broad-street, E.C.	100	Commerce.
J. W. Bradley, 47, Pall-mall, S.W.	100	Commerce.

By Order,

P. LE NEVE FOSTER, *Secretary.*

INTERNATIONAL EXHIBITION OF 1862.

The following arrangements, in addition to those already published, have been made in Foreign Countries and the Colonies in reference to the Exhibition:—

Austria.

Communications to be addressed to the Exhibition Committee, Imperial Ministry of Commerce, Vienna.

Hamburg.

Senator A Rücker, *President.*
Communications to be addressed to G. J. Göschen, 12, Austin Friars, E.C.

Liberia.

Gerard Ralston, Esq., Consul General, 21, Tokenhouse-yard, London, E.C.

Mecklenburg-Schwerin.

Monsieur le Comte de Schlieffen à Schlieffenberg, Güstrow, et Monsieur Dippe, Conseiller Grand Ducal au Département des Affaires de Commerce et d'Industrie à Schwerin.

Mecklenburg-Strelitz.

The Government of the Grand Duke.

Persia.

Agha Mehdi, Chief of the Merchants.

Weimar.

The Prussian Commission will act for this State.

The Cape Colony.

A Commission of twenty-four members appointed at Cape Town to act for the Western Province, and of eighteen for the Eastern Province at Grahamstown.

Natal.

Dr. James Mann, *Hon. Sec.*, Pietermaritzberg.

Trinidad.

A Commission of five members appointed, consisting of the Governor, the Hon. C. W. Warner, the Hon. Dr. Mitchell, H. Crügen, Esq., Charles Feez, Esq., and Sylvester Devenish, Esq., *Secretary.*

Victoria.

A Commissioner of seventeen members appointed.
Dr. John M'Adam, *Hon. Sec.*, Melbourne.

Ionian Islands.

A Central Commission of nine members appointed by the Senate.
The Regent, *Chairman.*
H. Drummond Wolff, Esq., C.M.G., *Vice-President and Secretary*, Corfu.

Hawiian or Sandwich Islands.

Manley Hopkins, Hawaiian Consul, *London Commissioner*, 4, Royal Exchange-buildings, E.C.

The Commissioners have received information that the following Local Committees have been formed in addition to those already published:—

Bradford.

H. W. Ripley, Esq., *Chairman.*
J. Darlington, Esq., *Secretary.*

Kilmarnock.

The Mayor, *Chairman.*
The Town Clerk, *Secretary.*

Middlesbrough.

The Mayor, *Chairman.*
John Dunning, Esq., and Dr. J. Richardson, *Secretaries.*

Much Wenlock.

The Mayor, *Chairman.*
R. C. Blakeway, Esq., *Secretary.*

Oldham.
The Mayor, *Chairman.*
John Sharples, Esq., *Secretary.*

Tewkesbury.
J. Yorke, Esq., *Chairman.*
The Mayor, *Secretary.*

Yarmouth (Great.)
The Mayor, *Chairman.*
Town Clerk, *Secretary.*

The following regulations, in addition to those already published, have been issued by Her Majesty's Commissioners in reference to Foreign and Colonial Goods intended for Exhibition:—

106. Every article sent separately, and every package, must be legibly marked with the name of the foreign country or colony of which it is the produce or manufacture, and, as far as practicable, with the name of the exhibitor or exhibitors.

107. The following is the Form of Address which should be adopted:—

To the Commissioners for the Exhibition of 1862,

Building, South Kensington, London.

From [state Country, and Exhibitor's name.]

To prevent loss, miscarriage, or mislaying, articles or packing cases containing them, which occupy less bulk than two cubic feet, should not be sent separately, but packages under such size containing, as far as possible, the same classes of articles, should be transmitted in combination.

108. Her Majesty's Commissioners of Customs have laid down the following regulations upon the importation of goods intended for the Exhibition:—

a. All packages containing goods intended for the International Exhibition of 1862 shall be specially reported as such, and shall be addressed to the Commissioners of the International Exhibition, or to one of their officers, and be consigned to a duly accredited agent, and shall be accompanied with a specification of their contents and value. They shall be separately entered as intended for the International Exhibition, and the agents in passing their entries shall specify the full contents of the packages, together with the value.

b. Such packages as may be landed in London shall be forwarded unopened to the Exhibition in charge of an approved licensed carman, accompanied by a cart note from the landing officer, giving a description of the packages and the marks and numbers thereon; and in cases where there may be reason to suppose they contain other goods than those for the Exhibition they shall also be accompanied by a revenue officer.

c. Packages landed at the out-ports shall be forwarded with a similar note by railway or other public conveyance, under seals of office, direct to the Exhibition, the officers at the respective ports taking care that the packages bear no private address, and that the documents relating thereto be immediately forwarded to the proper officers of Her Majesty's Customs stationed at the Exhibition.

d. On the arrival of the goods at the Exhibition, no package shall be opened without the knowledge and consent of the officer of Customs, and if the goods be found to agree with the entry or specification, they will, if free, be at once considered as out of charge of the Customs, the entry or declaration being deemed sufficient for all statistical purposes.

e. In the case of all dutiable goods, an account will be taken by the officers of the Crown at the time of the first opening of the packages, but such deficiences as may occur within the building from any legitimate or unavoidable cause, the officers being fully satisfied thereof, shall not be charged with duty.

f. That the building be considered, for all practical purposes, a "bonded warehouse;" and that in all cases where dutiable goods shall not be exported, but retained for use in this country, the duty shall be assessed by the officer in charge at the building (and received in the Exhibition by a clerk duly appointed for the purpose), in accordance with the practice now existing in regard to articles found in "passengers' baggage."

g. In the case of dutiable goods for exportation, an entry shall be passed in the Long Room, and bond given for their due exportation; and on the receipt of this entry by the officer in charge of the building, the goods shall be packed in his presence, and, if for shipment at an outport, placed under seal, and forwarded in charge to a railway or other public company; but if for shipment at London they shall be sent in charge of Customs officers, at the expense of the exporter, to be delivered into the charge of the searcher of the station from which they are to be shipped, without further examination, under the regulations applicable to goods shipped direct from the warehouse.

THE MANSFELD COPPER-SLATE MINES IN PRUSSIAN SAXONY.

By W. P. Jervis, F.G.S., Mining Engineer.

(*Continued from page* 609.)

I have purposely excluded the silicious ores (*Sanderze*) in this description, believing them to be of secondary formation, and produced at the expense of the copper-slate by the infiltration of water, &c. Throughout the Eisleben basin the sand ores are very scarce, and only met with in one restricted spot near Erdmann shaft (Schaafbreiter Revier). I attribute their occurrence there to the mass of water which lodged for ages in the adjacent large gypsum grottoes, for the sandstone is only cupriferous below these, and the depth to which it penetrates into the compact rock (less than an inch) seems to be an argument in favour of its not having been originally deposited there. Where sand ores are abundant, as may be seen in old workings, fibrous gypsum in prismatic crystals penetrates not only into the copper-slate and among the sand ores, but also deeper into the *Weissliegendes*, proving, incontestibly, the passage of large quantities of water through the rock, and the fact of the re-arrangement of minerals held in solution. A more decisive argument might be adduced from the frequency of veins of purple and gray copper in the vicinity of faults, perpendicular to the bedding, throughout the thickness of the *Lette*, and precisely similar to the horizontal ones; these could not, evidently, have been produced at the same time as the former.

The general N.W., S.E. strike of the rocks is accompanied by a vast number of parallel dislocations of the strata; these are continuous in proportion to their vertical fracture. The principal fault in the Eisleben basin is Schumann's *Rücken* (Schumann's fault), between Erdmann and Martin shafts, nearly perpendicular, and 13 *Lachter* (15 fathoms) deep; it runs for a considerable distance N.W., S.E., in the direction of the strike. This fault, being so important, rendered the construction of the level N. of Erdmann shaft very expensive, apart from the necessity of carrying it for some distance through sterile *Rothliegendes*, with the uncertainty how high the copper-slate might be above the roof until the rock was bored upwards. By following the dip the level has once more reached the copper bed. The fissures accompanying faults are generally filled with carbonate of lime penetrating the sandstone, also sulphate of barytes. When in direct contact with the copper-slate a polished surface is generally produced by friction, and a trace of ore is usually met with. A smaller and more local "throw" is distinguished as a *Horst*, where the copper-slate is commonly more or less

continuous, sometimes curving entirely round the throw; at other times only the calcareous beds are interrupted, and more generally only the *Lette* and *Schramm*, from their plastic character form the connecting link. Galena, with large crystalline faces, is frequently found in the *Dach*, in the immediate neighbourhood of faults (Martin shaft, &c.,) also nests of heavy spar accompanied by copper-nickel for the distance of several yards on either side of the fault. Galena is nowhere sufficiently plentiful in the Eisleben basin to pay; the nickel is rare. Where abundant, such dislocations have produced a beautiful phenomenon of plication on the harder *Lette* and *Schramm;* the folds observed at the Martin shaft are half an inch deep, and have a continuous denticulated appearance; the black *Schramm*, on the other hand, has very polished curved surfaces, generally coated with copper pyrites, purple copper, and more rarely native silver. These smooth portions are called *Gleiten* or *Rutschen;* (*gleiten*, to glide; *rutschen*, to slide;) the surfaces are termed *Rutschflacken*, (gliding surfaces). As a rule, where the sand ores are abundant the *Schiefer* above is poor, but near faults the amount of ore procurable from any given area is decidedly greater than elsewhere. This is easily accounted for; the copper ore which is held in solution in water follows the strata in the direction of the dip until it arrives at the fault, where the interruption in its course is sufficiently long to enable the heavier particles to separate and deposit,* so that they soon arrange themselves in tiny veins.

The copper ores are mostly argentiferous, though only the purple copper ore and copper pyrites are rich in silver. It is generally allowed that in the deepest parts of the mines the quantity of silver slightly increases. Bergrath Plümicke shewed me as a great rarity a little specimen of native copper, but this and the native silver have probably been produced by electro-magnetic agency decomposing the sulphuretted combinations.

At Martin shaft the *Lette* is no longer good, but the *Kammschale* is rich; further on the *Dach* is useless. East of the road from Eisleben to Hettstädt the copper-slate is very poor, and contains a very small proportion of silver. These points differ considerably, but we must bear in mind they are many leagues apart, for in a restricted locality corresponding analyses would not vary materially.

The mode of laying out a *Kupferschiefer* mine is entirely peculiar. The shafts proceed at once to the adit, and thence to the copper-slate bed, where they invariably terminate; whereas, in most other mines, numerous levels are driven right and left. Arrived at the ore, a level (*Strecke*) is made in the direction of the strike, with sufficient rise to effect the drainage. At a convenient point an inclined plane (*Querschlag*) is formed in the direction of the dip, ascending or descending perpendicular to the level. It is a custom to make parallel levels start from the *Querschlag* at uniform distances of 30 *Lachter* (34 fathoms) and from their being employed in conveying ore they are designated working levels (*Gezeug Strecke*). Each is furnished with a tramway, and while in course of construction with a 12-inch zinc ventilating pipe, requiring no further current than that produced by the difference of temperature at either open end. The levels are roomy and airy, about 6 feet by 5½, but the inclined cross-courses have to be made much wider, to admit of a double tramway, for the alternate ascent and descent of waggons attached to a wire rope, and set in motion by a subterranean steam-engine, as at Maschinen shaft, where the drum is wound up by a pair of oscillating high-pressure cylinders. Sometimes the uppermost waggon of the descending train is fitted up as a cistern, and filled by a hose; this draws up the full waggons to the level of the bottom of the shaft, and the water is let out into the adit level.

* A somewhat similar phenomenon is observed in rivers where much mineral matter is held in suspension; where the current is impeded, as at the end of a reach, the solid particles tend to deposit in great quantities and form a bank.

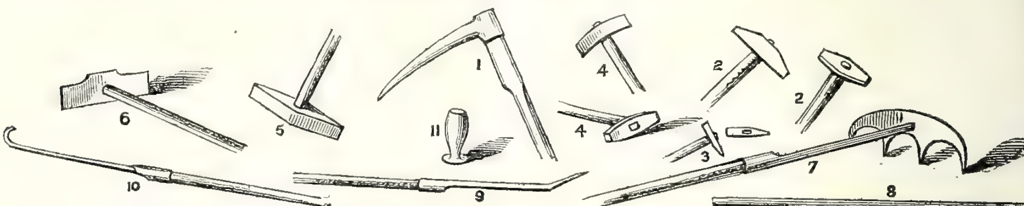
Such an arrangement is used at Johannis shaft, Sangerhausen, with great success, since there is abundance of water at the higher part of the mine.

The inclination of the cross-courses entirely depends upon that of the strata, as the floor is invariably formed by the *Weissliegendes*, and the roof made at the expense of the limestone above. The waggons (*englische Wagen*) are constructed of boiler plate; those employed in the cross-courses are much longer than the rest in the levels, which being propelled by young men, are made as light as possible, only weighing 10 *Centner*, and containing 8 to 10 *Centner* of ore. When once these preliminary openings have been completed, the ground is laid out among gangs of miners (*Mannschaften*) who commence the formation of *Streebe Fahrten*, that is, the entire extraction of the copper slate. The rock thus undermined would threaten the lives of the men at any moment, and the utter obliteration of the levels, but for a most ingenious device. An equal space of ground is systematically planned out on either side of the cross-course, in the form of a very acute isosceles triangle, the base of which corresponds with the level. Small at first, the triangle continually expands by parallel increments, and is always bi-sected by the cross-course, where the pressure of the roof continues to be equally distributed on either side. The local thickness of the cupriferous beds, 15 to 24 inches, represents the height of the *Streebe Fahrten*. The miners work for 8 hours in a reclining position, resting on their left shoulder, which unavoidably deprives the corresponding hand of much of its power. They are placed as close as possible along the legs of the triangle, that is, about seven feet apart, the feet of the one above the head of the other. At first, 6-inch billets of fir (*Stempel*) are driven in to support the roof, and columns of rough stone (*Fauler*), 4 to 6 feet square. As the space increases it is filled in with rubbish and worthless slate, carefully packed up like a dry wall, so that eventually the whole roof quietly settles down, only sinking two or three inches by the compression of the stone work, and in no way impeding the men. Thus does the scene of operations continually advance, and the whole of the ore is extracted. The fathom adjoining the actual work is always left free for the passage of boys who drag out the ore to the levels in little wooden boxes tied to their waists. The reader will find a certain analogy with the working of coal mines. A stranger would find the mode of progression through a *Streebe Fahrt* unique and painful in the extreme; narrow wooden shields are strapped on the left shoulder and left leg, and the leathern girdle behind the hips; the miner then wriggles along, worm fashion, on his side, by the alternate advance of his arms and retraction of his legs, sliding on the boards with considerable dexterity. The lowest of these passages into which I had occasion to enter was an ancient and long unused one, 250 feet long, barely twelve inches high, and a dead level! After twenty minutes' violent exertion in a horizontal position, I experienced a very unpleasant sensation of blood to the head; on my return I heard of an elderly captain who had bravely entered, but, getting aground in the middle of his voyage, had to be towed out by main force, by having his legs pulled backwards. Even with the modern workings of 15 to 18 inches, the continual exertion of the limbs in a very unfavourable position, and the pressure on the chest, is injurious in the long run to the miners, and combined with the fine dust from the schists entering the lungs, produces *Dampf*, a very oppressive disease, allied to asthma. The mining authorities do their utmost to guard the men against the pernicious effects of this malady, by allowing its victims to exchange their underground occupations for others at the surface.

Every three months (*Quartal*) the progress of the *Streebe Fahrten* is indicated on a large plan as the work of the 1st, 2nd, 3rd, and 4th quarter, and at the close of the financial year the extremity of the levels is marked by a cross with the date.

The tools employed in extracting the softer slate are a pick (*Keilhauer*), by which the men undermine the firmer

slate, besides which each carries a string of gads or hammer-heads (*Eisen*), into which a stick loosely driven fresh every time serves as a temporary handle, and saves him from the concussion produced by the sledge (*Schlegel*). For blasting in the levels, round borers (*Böhr Eisen*) a foot long are used; the loose material is picked up in triangular shovels (*Schaufel*). Convenient smithies are established at the bottom of the mines for the repairs of these tools. Previous to laying the tramroads low wheel-barrows (*Schiebkarrn*, literally shoving carts,) are employed, which the youths (*Karrnlaufer*) do not touch with their hands, but propel by a strap passing over their shoulders. One *Karrnlaufer* is allotted to so many men, of whom some are reckoned as expert miners, (*Hauer* or *Vollhauer*), the rest as apprentices (*Lehrhauer*). The ore which each gang of men extracts is kept by itself until the end of the month, when it is examined by the captains, and they are paid accordingly; but the waggon-lads have fixed wages. This constitutes a two-fold classification into "tribute" or contract work, (*Gedingarbeit*), and work for wages, (*Lohnarbeit*). With the former class a fresh contract is made every month, and if they do not agree to the terms, a bargain is struck more in accordance with the combined interests of employers and employed. In case of any unforseen difficulty, such as the increased hardness of the rock or a considerable body of water, the men have the right of appeal and are paid an equivalent. This is a most equitable system, for the miners profit in proportion to their diligence. When the ore reaches the surface it is distributed among a number of elderly men, (*Klauber*,) to be broken up and sorted. The sorters are arranged in a line on one side of a railway running on the summit of a wall. Each man is sheltered from the weather, sitting under a wooden frame, with his feet hanging over a pair of bins. He is provided with a dividing hammer, (*Scheidehammer*), one end of which is flat and sharp, so as to laminate the slates. Throwing away the useless rock, he lets fall the rich ore into one bin and the poor into the other, after breaking it up into fragments of a cubic inch or two ready for roasting.



W. P. Jervis, Ad. Nat.

Tools Employed at the Mansfeld Mines.

1. Pick (*Keilhauer*). 2. Sledge (*Schlegel*). 3. Gad (*Eisen*) 4. *Klaubenhammer*. 5. *Scheidehammer*. 6. *Kracke*. 7. *Schlackenharken*. 8. Borer (*Bohreisen*). 9. *Lufteschippe*. 10. *Abziehehaken*. 11. Crucible (*Kupfer Tutchen*).

After so detailed an account of the Eisleben basin, it would be tedious to enter into too many particulars regarding that of Sangerhausen. The mines are there worked high above the valley at the edge of the basin; the beds inclining towards the Goldene Aue the drainage is far more easily effected, than near Eisleben, which is ten miles to the east. Few shafts are at work, and those on a small scale, between Morungen and Gross Leinungen, five or six miles above Sangerhausen. The neighbourhood of the mines hitherto spoken of is all cultivated land; these are in the midst of extensive royal plantations of underwood, and the ground is very hilly as it forms part of the Hartz.

The territory of Morungen, as we have seen, belonged in former times to the Counts of Mansfeld, and later fell into the hands of the Counts of Einsiedel. The mines have been generally worked independently of the rest; in the last century they were farmed by the Brothers Bethmann, of Frankfort, and were only acquired by the Mansfeld Company in 1834; they continued the system of smelting and selling the Sangerhausen copper separately for several years, having an idea it was better suited for the brass manufacturers, but now no difference is made, all is refined together.

The chief workings around Carolus and Johannis shafts are connected together internally; the former is 51 *Lachter* (55 fathoms) deep, the latter 52 (56 fathoms), to the Gonna adit level, and 12 more to the deep workings (*Tiefbau Sohle*). Drainage is already effected by the Segen Gottes level, the entrance to which is above Sangerhausen. Most of the ore is here found in the *Weissliegendes*, thus: in the Carolus shaft, a square *Lachter* yields 12 *Centner* of silicious ore, and 36 *Centner* of poor copper-slate. The slate is not always remunerative in itself, but the slightly cupriferous *Dach* and *Kopf* are extracted from lack of better materials as a flux. The silicious ores are $1\frac{1}{2}$ to $2\frac{1}{2}$ inches thick, of which the upper inch is rich, containing 10 per cent. of copper; the rest is poor, not exceeding 5 per cent.; they are separated for the convenience of roasting, and then stamped.

One or two important faults run through the "sett," accompanied by rich masses of copper-nickel now largely extracted, occurring on both sides of the dislocation, disseminated in the most complete manner in heavy spar. After long exposure, the nickel ore becomes covered with oxide, nickel ochre; sometimes the whole lump is thus altered. It is invariably accompanied with cobalt, which is made apparent under similar circumstances by a roseate blush of earthy erythrene. A singular history is connected with the 4th experimental shaft (*vierte Versuchs Schacht*). It had been worked for copper-slate, when improvements in the art of smelting proved that the highly silicious ores could be turned to advantage without loss in the slags, so the whole ground was laid open again. The shaft and levels are now in operation for the third time along the fault, to extract the copper nickel, a substance so long considered prejudicial to other ores—the miners' great enemy. It is well-known that cobalt owes its name to Kobold, the evil spirit of the German miners. Nickel comes from an an obselete word *nicken*, and signifies something very bad. The assertion is not entirely groundless; nickel and cobalt are arsenuretted ores, and never found together with the sulphuretted combinations of copper, which they in a measure replace. It is only lately that we know the great utility of these ill-named metals.

Every half year a general sampling takes place before the dividends are declared, and the scheme for the following six months published. A lock-up chest, containing several hundred-weight of ore, is filled at each part of the mines. This undergoes the preliminary smelting operations at the works in special assay furnaces (*Probiröfen.*) When brought to the state of a rich matt (*Spurstein*), a labelled bottle of each sort is forwarded to the laboratory at the Gewerken Haus, at Eisleben. The assay *Centner* here made use of (*Probirgewicht*), is the 10,000th part of the commercial weight.

Assay Weights.

Komm.					
10 =	1 *Cent.*				
100 =	10 =	1 *Quentchen.*			
300 =	30 =	3 =	1 *Centner* (assay weight.)		
1,000 =	100 =	10 =	1 *Loth.*		
30,000 =	3,000 =	300 =	30 =	1 *Pfund.* =	500 *grammes.*

500 *Centner* assay weight (2.5 *kilogrammes*) of rich matt constitute an envoy (*Lieferung*); this is roasted with three *Quentchen* of black flux (*Schwartzflusz*), and reduced to a metallic button, in a pear-shaped crucible, (*Kupfer Tütchen*). The button is dissolved with hydrochloric acid, in a beaker, and a small iron wire, three inches long, is thrown in to precipitate the cement copper. If the copper be carefully weighed the most accurate results can be obtained; 1½ per cent. is allowed for loss in smelting. The estimation of the silver is made in the ordinary manner, by fusing a large quantity of matt in a muffle, with twenty-four times its weight of lead, and weighing the pure button of silver after cupellation. Nickel ores are roasted and oxydised, and then reduced by a current of dry hydrogen to the metallic state. On an average, the entire copper-slate ores contain 0·5 per cent. of nickel, which is lost.

On the large scale the ores are estimated in *Fuder* of 60 *Centner*, or 6,000 *Zoll* pounds. 1 *Fuder* is equal to 59 cwt., 53,328lbs. In 1859 the quantity of copper-slate and sand-ores extracted from the Mansfeld mines was 19,243 *Fuder*, or 47,214 tons.

	Zoll pounds of refined copper per *Fuder* of ore (1860).	Or per cent.	Silver per *Ctr.* of refined copper. *Loth*	*Grän.*
Rich sand ores from Carolus shaft yield ... ... about	600 ...	10·0		
Poor ditto ,, ,, ,,	300 ...	5·0		
Workings near Kloster Mansfeld...	300 ...	5·0		
,, below the Schlüssel level yielded, 1857	232·02...	3·86 ...	18	4·68
35th Ventilating shaft yields about	190 ...	3·16		
Workings near Helbra ,, ,,	150 ...	2·5		
,, ,, Wimmelburg ,,	120 ...	2·0		
Hornickel shaft yields ,,	90 ...	1·5		
Average produce throughout the mines:—				
Upper Reviere	— ...	2·75 to 3·75 ..	16·32 to 22	
,, ,, occasionally ...	— ...	4·0 ...		
Lower Reviere	— ...	2·0 to 4·5 ...	14·5 to 17	

2½ per cent. is considered remunerative for slate, 5 per cent. for silicious ores. The average amount of silver is 15 *Loth.* per *Centner* of refined copper, or $\frac{1}{200}$.

The scale of wages paid to the several categories of men per eight hours *Schicht* are as follows:—

Skilful miners, (*Hauer*,) earn on an average, 15 *Silbergroschen*, or 1s. 6d.; apprentices, (*Lehrhauer*,) are paid in gangs, (*Kameradschaften*), 6 to 7 *Silbergroschen*, or 7¼d. to 8½.; youths employed in conveying the ore, (*Junger*), are divided into classes according to their age, and receive from 4 to 5 *Silbergroschen*, or 5d. to 7½d.; above ground, sorters or breakers-up, (*Klauber*), 10 *Silbergroschen*, or 1s.; Carpenters, (*Zimmerlinge*), Masons, &c., according to their skilfulness, 10 to 15 *Silbergroschen*, or 1s. to 1s. 6d.

All the men on the permanent establishment of the Mansfeld Company are moreover supplied every monthly pay-day with a certain quantity of barley, at the fixed price of 1 *Thaler* 5 *Silbergroschen* per *Scheffel* (18s. 4d. per quarter), going by the name of *Roggenbonification*; it consists of—

2¼ bushels to each first-class miner, sorter, mason, carpenter, &c.
1⅛ ,, to each apprentice miner.
¾ ,, to the youths, who are supposed to be unmarried.

The distinction into "youths" and "men" is not arbitrary. The former embraces all under 20 years of age, when every Prussian, whatever be his rank, enters the military service for three years; after the return of the veteran, he is dubbed with the title of "man." It may here be remarked that the Mansfeld miners are highly prized by the Government agents for the engineer corps; but it may be questioned whether this break in their occupations, at a time of life when a young man is too apt to follow desultory habits, is not prejudicial to commercial enterprise.

The composition of the Mansfeld ores, according to Dr. Böttcher, the able analyst of the mines, is:—

	Per Cent.
Silica	45 to 50
Alumina	4 to 8
Lime	20
Protoxide and peroxide of iron	10 to 20
Sulphur and combinations of copper	8

Water and bitumen in various proportions. Occasionally magnesia, potash, nickel, cobalt, blende and lead; traces of arsenic, antimony, molybdenum, selenium, and vanadium.

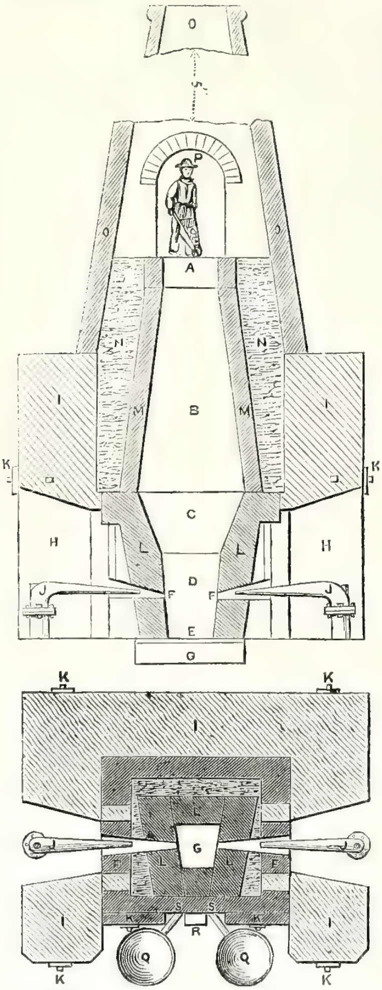
Metallurgy.

1. Roasting, (*brennen der Schiefer*).—The bulky copper-slate is roasted for six weeks to a quarter of a year in oblong mounds, (*Rosthaufen*) 4½ to 6 feet high, and several hundred feet long, containing 300 to 1,000 tons of slate (6,000 to 20,000 *Ctr.*) To make such a roasting pile faggots of beech or other hard wood are laid on the ground to the depth of a foot, above which the slate is piled sufficiently loose to allow the pasage of air; in proportion as the water is driven off, the sulphur and bitumen of the ore serve to keep up the combustion; too great activity is prevented by adding fresh quantities of ore wherever flames break forth at the surface. At the close of this operation, which is chiefly carried on at the Kreutz works, Leimbach, and Kupfer works, Sangerhausen, the slate becomes foliated and friable by the loss of the water; the calcareous strata are partially reduced to the state of impure lime; part of the clay combines with any oxide of iron present, appearing like badly baked brick; lastly, much of the ore is oxidized, while the rest forms a more concentrated sulphide. When the roasting is completed the men separate the under part, which has been sufficiently subjected to the action of fire, from the upper; this latter is put on a subsequent heap to be re-roasted.

2. First fusion in a cupola furnace (See wood cut, next page), (*Rohschmelzen* in a *Brillenofen* or *Schachtofen.*) The roasted slate, (*gerösteter Schiefer*) is thrown in at the summit of an inverted truncated cone, called the shaft of the cupola, (*Schacht*), with an aperture 3 feet in diameter, thence it falls into the *Kohlensak*, a short cylindrical prism, communicating directly with the kiln *(Rost)*, in which fusion takes place. The lowest part of the furnace is called the *Gestell* and is entirely constructed of refractory bricks. The furnace is built in a massive manner, so as to appear square at the exterior, only interrupted below by three archways, that in front allow direct access to two tap-holes, *(Anger* or *Räse)*, at the bottom of the *Gestell*, and while forming the support of a false wall, between which and the furnace the gases are drawn up the chimney, admit of the repair of the *Gestell* and breast of the furnace at a trifling expense whenever the refractory bricks have been too much acted on by the fluxes. Special names are given to the sides of the Mansfeld furnaces, thus, the *Vorwand*, or front; the *Rückwand*, or back; the *Formenwande*, or lateral faces. The *Vorwand* being the weakest is bound together by numerous wrought iron stays, *(Anker)*, and is repaired at intervals of a quarter of a year. The lateral arches are constructed for the purpose of admitting the blast on either side through a square 12-inch aperture called the *Form*, 2ft. 2in. above the base. The tuyères themselves *(Tuse)*, do not touch the *Form*, which becomes almost red hot, the nozzles being terminated in a canal of refractory clay, renewable at pleasure. The base of the furnace is a single refractory stone, *(Sohlstein)*, having a fall of 3 inches forward, to facilitate the flow of the fused product. The cupola is constructed of refractory Permian red sandstone from the quarries between Muhldorf and Mansfeld; for the sake of economy the lining is isolated from the exterior mass of masonry, which serves little else than as a buttress, by filling up the intermediate space with ashes, as a bad conductor of heat. By this contrivance the outer structure lasts for years, and the damaged stone work can be repaired with the utmost ease by removing the ashes.

The proportions adopted for a furnace charge *(Beschickung)*, depend much on the nature of the ore. The roasted calcareous slate is mixed with convenient propor-

tions of coke, fluor-spar, and slags from the preceding operations, as well as from the manufacture of concentrated matt and black copper.



W. P. JERVIS, Ad. Nat. Scale $\frac{1}{120}$

CUPOLA (*Schachtofen* or *Brillenofen*).

A. *Gicht.* B. *Schacht.* C. *Kohlensak.* D. *Gestell.* E. Level of tap holes (*Rase*). F. *Form.* G. *Sohlstein.* H. Archways (*Formenwalbe*). I. Masonry casing. J. Tuyères (*Tuse*). K. Iron stays (*Anker*). L. Reverberatory stone. M. Masonry. N. Ashes. O. Brick chimney. P. Archway entrance. Q. Basins (*Tiegel*). S. Breast of furnace.

Having gradually descended, and been subjected to a very elevated temperature by the ordinary blasts, the sulphuretted copper ores tend to become concentrated into a mass, easily separating by its weight from the lighter slags, the fluor spar at the same time forming gaseous combinations, which go up the chimney. One of a pair of tap-holes is now forced open by driving in the clay plug, whereby the red-hot slags gradually flow out in the viscid condition of molten lava, accompanied by the matt, into the hearth (*Heerde*), an hemispherical excavation in the ground in front of the furnace, about 3½ feet in diameter: the blast meanwhile forces out a small ghastly pale jet of grayish-blue flame, accompanied by dense white fumes, resulting from the combustion of a mixture of the oxides of zinc and antimony: occasionally the flame is tinged green by the gasification of a small quantity of oxide of copper. It is to carry away these highly suffocating compounds that the furnace is supplied with the double wall in front, so that, notwithstanding the quantity continually issuing forth, no inconvenience is felt by the smelters. At the end of an hour or two the basin begins to fill, the matt settling to the bottom. A man now proceeds to remove the upper part of the slag (*Schlackenkopf*) in a cake (*Schlackenfell*), dragging it out of the building with a strong rake (*Harken*); the most plastic part, however, is formed into blocks in iron brick-shaped moulds, about 18 inches long; a second man immediately lifts off the end of the frame and removes the block (*Formatstein*) into the open air by the aid of a long hook (*Haken*). This operation is carried on with considerable rapidity, and in no way interferes with the duties of the smelters. The bricks are their perquisite: they are sold on the spot as a building material, for 5s. per hundred. During the six to eight hours in which the products flow in this manner into the basin, the slags are removed 15 to 20 times. To be good, they must be basic silicates, and are known to be clean when black in the mass, with green bottle-glass bubbles. The lower part of the slag is opaque red, being highly cupriferous, and is set aside to add to subsequent charges. The basin being filled, the first plughole is stopped up with clay, and the other one opened to fill the remaining basin. In this manner alternate conical cakes of matt (*Rohstein*), weighing from 10 to 12 cwt., are procured. A rod with a ring at the end is thrust into the centre, and when cold enough it is lifted out and broken into fragments, for the convenience of smelting. The first matt ranges from 23 to 58 per cent. of copper, and has a coarse irregular fracture and somewhat metallic aspect. The formation of matt in cupola furnaces is carried on at the following works, called *Rohhutten*:—

Kupferkammer Works	...	Burgörner.
Kreutz	,, ...	Leimbach.
Katharinen	,, ...	
Eckhardt's	,, ...	
Mittel	,, ...	Eisleben.
Ober	,, ...	
Kupfer	,, ...	Sangerhausen.

Analysis of the Rohstein Matt.

	P. cent of Copper.	Corresponding Formulæ.	Authorities.
1. Kupferkammer Works ..	27.30	... ...	Official MSS. for 1857.
2. Ditto	to 29.60		
3. Ditto	23.58	4 (FeS,ZnS,NiS) Cu_2S	Bruno Kerl.
4. Ditto	to 31.70	... ...	
5. Eisleben ...	48.25	... ...	
6. Ditto	36.50	... ...	Official MSS. for 1857.
7. Ditto	to 38.20	... ...	
8. Mansfeld ...	42.10	... ...	Bruno Kerl.
9. Katharinen ..	43.62	FeS,Cu_2S	
10. Sangerhausen...	47.27	FeS,Cu_2S	
11. Ditto	52.44	6FeS,7Cu_2S	
12. Ditto	58.60	... ...	

The ores at Sangerhausen are chiefly silicious and highly refractory. They undergo preparatory stamping, and are freed as much as possible from quartz by washing in a gigging machine (*Stossheerde*). Good limestone is wholly unprocurable in the neighbourhood, but is partly substituted by the *Dach*, notwithstanding which it may be observed that far more fluor spar is employed than at Eisleben or Mansfeld. The air is here heated to about 325° Fahr., or 130° R, in its passage through four rows of zig-zag tubes contained in a spacious chamber, through which the flames of a step-grate furnace circulate freely. This contrivance, called *Lufterhitzungs Apparat*, is heated with dusty brown coal. The Sangerhausen matt is denser than that from Leimbach, and is sent off to the Eisleben works. Eckhardt's works, the newest of all (not yet completed) form a magnificent pile of buildings on the hill-side north of Leimbach, and contain some ponderous machinery for supplying the blast. The fires were first lit on the 22nd of January, 1860. To bring them up to the requisite temperature with charcoal and coke required six weeks, but eight days is quite sufficient for old furnaces after the usual repairs.

3. Second roasting (*Concentration*). The broken-up

PROPORTION OF CHARGES PER *FUDER* (60 *CENTNER*) OF ORE.

	ECKHARDT'S WORKS. Leimbach.	KREUTZ WORKS. Leimbach, 4 furnaces.	KUPFERKAMMER WORKS. Burgörner.	KUPFER WORKS. Sangerhausen.	MANSFELD MINES, according to Bruno Kerl (not specifying any works.)
Roasted Slate	60 *Centner.*	60 *Centner.*	60 *Centr.*	24	60 *Centner.*
Cupriferous limestone (*Dach*)	... ,,	... ,,	... ,,	6	
Silicious ores (*Sanderze*)	... ,,	... ,,	... ,,	30	
				— 60 *Centner.*	
Slags from reverberatory furnaces (*Spurschlacke*)	2 ,,	... ,,	From Leimbach 3 ,,	2.5 to 3 ,,	Unspecified.
Slags (unspecified)	... ,,	3.5 to 4 ,,	... ,,	... ,,	
Scum of purification of matt (*Kratz*) ...	4 to 6 ,,	... ,,	... ,,	... ,,	
Fluor Spar	4 ,,	4 ,,	3.5 ,,	15 ,,	Do.
Coke, Westphalian or English	7 *Tonnen.*	... ,,	... ,,	... ,,	4.75 *Tonnen,*
,, Wettin or Berlin gasworks.	... ,,	... ,,	... ,,	... ,,	or 5. 6 ,,
,, unspecified.........	... ,,	7.5 *Tonnen.*	with cold blast 5.5 *Tonn.* ,, hot ,, 6.5 ,,	heavy coke 7·5 to 8 *Tonnen.* light ,, 10 to 10.5 ,,	
	4 *Fuder* or 240 *Centr.* are thrown in every 24 hours The charges are renewed 28 to 30 times every 12 hours.	4 *Fuder* per 24 hours; each producing 5 to 5½ *Ctr.* of 1st matt, (*Rohstein*).	3½ *Fuder* passed in 24 hours, each yielding 5 *Ctr.* of matt.	Produce per *Fuder*, 6 to 6½ *Centr.* 2 *Fuder* smelted daily. The furnaces are smaller than those of Leimbach. Average analysis:— Copper .... 45.00 Silver .... 0.07 Sulphur ..... 20 to 22.00 Iron, &c. ...... 33 to 35.00	Operation lasts 5½ to 6 hours. Average produce 4 to 4½ *Ctr.* of matt per *Fuder* of roasted ore.

Rohstein matt is roasted for a fortnight in little bins (*Stadeln*), enclosures 10 feet by 12, with a five-foot wall on three sides. The once roasted matt (*einfeuriger Stein*) contains lumps scarcely distinguishable from natural grey copper ore, that is, having equally metallic lustre, but not so easily scratched with a knife; the rest simply clots together, and is only tarnished like purple copper ore. After it has all been broken up by boys, the least changed part is removed to the adjoining bin, and once more roasted with a fresh quantity of wood. The product is twice roasted richer matt, called indifferently *zweifeuriger Stein*, *Gaarröst*, and *geröster* or *concentrirter Rohsteiin*. The same operation of comminution and sorting is repeated on the richer matt in the enclosure itself, by lads, who would almost appear to enjoy the dense suffocating fumes of sulphurous acid, which threaten at once to stifle the stranger bold enough to watch them. One *Ctr* of matt requires for roasting 0·1 *Tonne* of charcoal, and 0·1 *Stuck* of underwood.

4. Treatment of the roasted matt (*Gaarröst*) at Kreutz and Kupferkammer works in reverberatory furnaces (*Flammconcentrationsöfen*) to complete the formation of a pure matt. These furnaces have a rectangular base 14 feet by 20 feet, and are 5 feet high. Being subjected to great lateral thrust at a very elevated temperature, they are firmly strapped together by wrought iron stays (*Anker*). At one corner is the *Fuchs*, from which a canal eads to a lofty brick chimney. The bed is double and approached by two iron doors; that on the side serves for charging the matt (*Einsatz Thür*); the working door in front (*Arbeits Thür*) is to enable the men to stir up the matt with oblong scrapers (*Kräcken*) to prevent caking, and give free egress to the sulphurous acid, as well as to expose fresh surfaces to the oxidizing flame.

The following is an actual example of the proportions observed in the reverberatory furnaces at Kupferkammer works in September, 1860:—

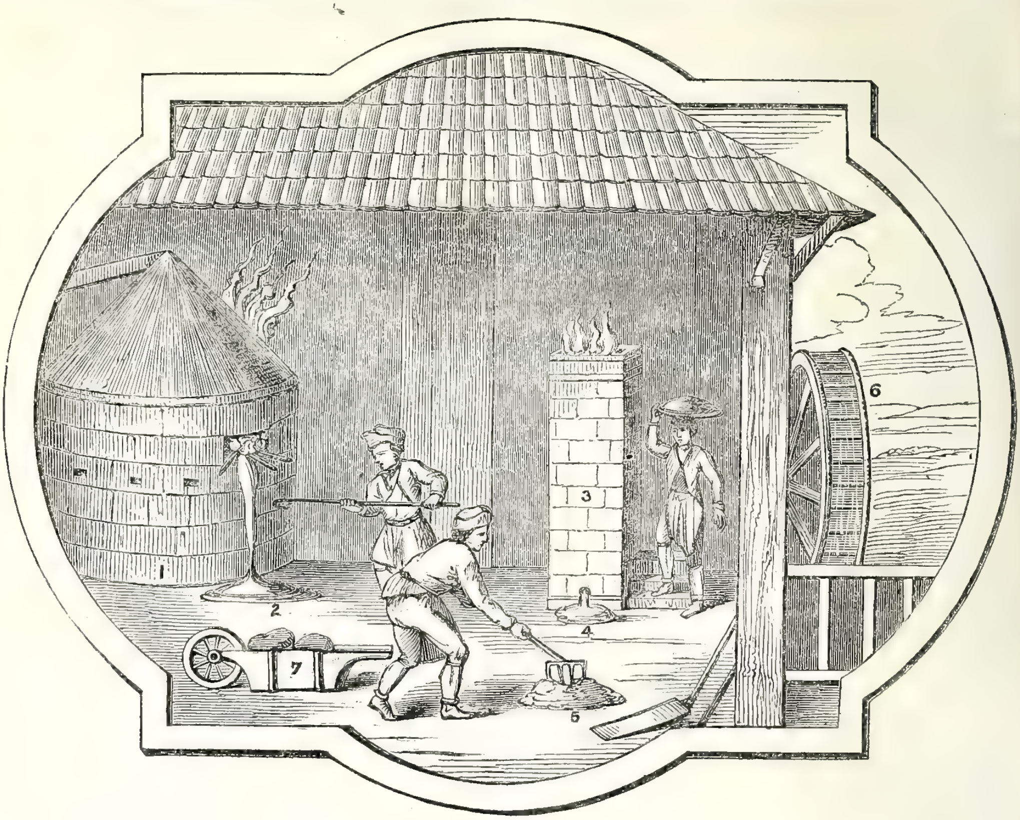
Roasted matt (Rost).		Slags (Schieferschlacken).	Sand.	Wettin Coal.	Riehstadt brown coal.
1st Week.	*Ctr.*	*Ctr.*	*Ctr.*	*Ton.*	*Ton.*
From Kupferkammer Works	226	...	20	29·0	39·0
,, Friedeburg ,,	228	12	18	28·5	40·5
,, Leinbach ,,	228	12	18	28·5	40 5
Total	682	24	56	86	120
2nd Week.					
Total	722	57	38	129	91

19 charges (*Sätzen* or *Chargen*) are treated weekly after the furnace is in order, about equal quantities of three kinds of matt. A single charge at the various works is given in the following page.

After two charges the matt, an almost pure disulphide of copper, Cu_2S is allowed to fall into water, whereby it is reduced to a fine state of division, like gravel (*Granaillen*), a recent improvement, which, combined with the subsequent pulverization under heavy millstones, greatly expedites the separation of the silver.

5. Desilvering process (*Entsilberung*).—Before describing the present system it may be well to say a word or two in chronological order about the discarded methods.

a. Formerly the silver was separated from the copper by means of lead (*geseigert*). The *saiger* or liquation process was very expensive, and particularly inapplicable to ores so poor in silver, and where such prodigious quantities of copper had to be treated, for the lead had to be brought all the way from the Hartz. In the desilvering process one-fifth of lead was employed to four-fifths of copper, to render the alloy fusible. This was moulded into discs, and subjected to liquation; the cakes were placed upright in rows on the sides of a distinct furnace, over a narrow opening; the intermediate space was now filled with charcoal, and the alloy raised to a regulated temperature: the silver leaving the copper combined in preference with the lead for which it had greater affinity, and by slow cooling the two latter metals were spontaneously squeezed out together, the discs roughly preserving their original form. The lead was then cupelled in a *Treibheerd*, represented in the cut on the next page, which I sketched from an ancient painting in St. Andreas Church at Eisleben; the little cupola on the right of the engraving was what was employed for the first fusion of the copper slate; the water-wheel supplying the blast. The litharge from the cupellation of the argentiferous lead was fused with fresh copper, while the silver and lead still remaining with the copper was extracted by "sweating;" that is, the discs were piled up in the furnace and slowly heated at a gentle temperature, to permit of the separation of a fresh quantity of lead; the remaining mass was once more heated, but more violently, and with access of air, so as to facilitate superficial oxidation. After repeating these alternate operations, the liquated discs were plunged into water to detach the oxidized crust.



Die Gluth bringt guth.

1. Cupelling furnace (*Treibheerd*). 2. Litharge. 3. Cupola (*Krummofen*). 4. Matt flowing out. 5. Removal of Slag. 6. Water-wheel for supplying the blast. 7. Wheel-barrow (*Schiebkarrn*) as still employed.

	KUPFERKAMMER WORKS.	KREUTZ WORKS.	MANSFELD MINES, ACCORDING TO BRUNO KERL, NOT SPECIFYING ANY WORKS.
1st Charge, Roasted matt	38 *Ctr.*	42 *Ctr.* after 8 or 9 hours slags removed	Once roasted matt ...... 12 *Ctr.* Twice „ „ ...... 12 „ 24 *Ctr.*
Sand.	3		4
Brown coal.	12 to 13 *Tonnen.*		(By volume) Riehstedt brown coal . 8·5 Vol. English coal .... 7·5 „ (By weight) brown coal .... 8 *Ton.*
Roasted matt.			After $2\frac{3}{4}$ hours add— Once roasted matt ...... 6 *Ctr.* Twice „ „ ...... 6 „ 12 *Ctr.* Treat four-and-a-half hours, then remove slags.
2d Charge, Roasted matt		42 *Ctr.* treated same way.	24 *Ctr.*
Sand.			3 *Ctr.*
Additional roasted matt.	The concentrated matt (*Spurstein*) yielded in 1857 63 to 66 per cent. of copper.—(Official M S.S.)	Two charges complete an *Abstich*, when the concentrated matt is withdrawn, yielding 74 per cent. of copper. In 1857, 70 44 to 75 6 per cent. of Copper.—(Official M.S.S.)	12 *Ctr.* Two charges require 18 to 20 hours, and yield concentrated matt (*Spurstein*), containing 70 to 76 per cent. of metal. *Ctr.* *Zoll lbs.* *Gran.* Copper .... 36 to 40 ... ... Fine Silver .... 251 Slag .... 36 to 40 ... ... Slagged copper (utmost) . ... 1·5 ... Copper in mechanically mixed matt .. .. 10·0 ...

b. At the commencement of this century amalgamation with mercury took the place of this tedious method of alloying with lead. This was still a most complicated affair, and required a very extensive apparatus, much machinery, and, above all, much expensive mercury, 10·96 *Loth* per *Centner* of copper, or $\frac{1}{32}$. It is only within the last 12 or 14 years that Messrs. Augustin and Ziervogel imagined anything at all suitable for the desilverisation of the ores.

c. The salt process of the former gentleman was at once adopted at the Gottesbelohnung works, a palatial establishment newly built for the amalgamation process on either side of the company's road from Hettstädt to Eisleben, by Leimbach. Augustin's process was a gigantic stride in advance; it consisted of roasting the concentrated matt in a reverberatory furnace, by which the sulphides of iron, copper and silver were converted by the oxidising action of air at a great heat into their corresponding sulphates, or vitriols ($FeO.SO_3$, $CuO. SO_3$ and $AgO.SO_3$) but at the very elevated temperature required for the formation of sulphate of silver, the others were almost entirely decomposed into peroxide of iron and oxide of copper (Fe_2O_3 and $Cu\ O$), with the evolution of sulphurous and sulphuric acids (SO_2 and SO_3). The sulphate of silver and any remaining sulphate of copper were at once treated with salt thrown into the furnace. Chlorides of silver and copper were formed, and sulphate of soda ($Ag\ Cl$, $Cu\ Cl$ and $NaO.SO_3$). The chloride of silver was then treated with a hot saturated solution of salt, by which it was dissolved, and ready to be precipitated by copper. The overjoyed shareholders voted Herr Augustin something like 63,000 *Thaler*, (£9450) when Herr Ziervogel struck out his water process. This was tried in its turn and found to supersede the device of his rival; the generosity of the Mansfeld company seemed to have forsaken them on this occasion; perhaps they feared that startling improvements might follow in too rapid succession, at any rate they are said to have given Ziervogel 800 *Thaler* (£126.) The salt process is still employed in Saxony, however inapplicable here, where the whole of the matt is desilverized at the Gottesbelohnung works by

d. Ziervogel's water process (*Wasserentsilberung*). The shot of concentrated matt, as in Augustin's method, is finely ground under heavy millstones and introduced into the reverberatory furnace, where the complex sulphides are allowed to oxidize. The furnaces have two floors, the powdered matt being introduced into the upper one, and continually raked about to expose fresh surfaces to the action of the air; the flame from the lower bed does not enter this floor, but only circulates round it. On removing these substances from the furnace the sulphate of silver, being soluble in water, is at once separated from the oxides of iron, copper, nickel, zinc, &c. The whole charge is distributed in vats (*Gefässe*), placed in a line on the upper floor of the building, and boiling water poured over them. The sulphate of silver with any traces of sulphate of copper speedily dissolves and runs out of the perforated bottom, on which are placed in succession several sized sieves, each finer than the last, and commencing with a wicker-work disc. The solution flows through a pipe into a lower series of vats, each containing 3 cwt. of impure black copper; chemical decompósition immediately ensues; the sulphuric acid leaving the silver attacks the bars of copper, which rapidly disappear, the liquid acquiring the well-known deep blue tint of copper vitriol; the silver is simultaneously liberated as an impalpable mud of cement silver (*Cement Silber*). After 24 hours the liquid has settled, and the vitriol is drawn off with a syphon into a third row of vats, coming in contact with fresh copper. The liquid is conducted into a reservoir, whence, after depositing any blue vitriol, it is pumped up to the vats again. The silver is thoroughly washed previous to being smelted in a small reverberatory furnace.

(*To be continued.*)

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The Thirty-first Meeting of the British Association for the Advancement of Science will commence in Manchester on Wednesday, the 4th of September, 1861, under the presidency of William Fairbairn, Esq., LL.D., F.R.S.

The General Committee will meet on Wednesday, the 4th of September, at one p.m., for the Election of Sectional Officers and the despatch of business usually brought before that body. On this occasion there will be presented the Report of the Council, embodying their proceedings during the past year. The General Committee will meet afterwards by adjournment.

The First General Meeting will be held on Wednesday, the 4th of September, at eight p.m., when the President will deliver an Address; the Concluding Meeting on Wednesday, the 11th of September, at three p.m., when the Association will be adjourned to its next place of meeting.

At two Evening Meetings, which will take place at eight p.m., Discourses on certain Branches of Science will be delivered. There will also be other Evening Meetings, at which opportunity will be afforded for general conversation among the members.

The Committees of Sections will meet daily, from Thursday the 5th of September to Wednesday the 11th of September, inclusive, at ten a.m., precisely.

The Sections will meet daily, from Thursday the 5th of September to Tuesday the 10th of September, inclusive, at eleven a.m., precisely.

The following are the titles of the Sections to which Communications may be presented:—

Section A. Mathematics and Physics.
,, B. Chemistry and Mineralogy, including their applications to Agriculture and the Arts.
,, C. Geology.
,, D. Zoology and Botany, including Physiology. Sub-section D.
,, E. Geography and Ethnology.
,, F. Economic Science and Statistics.
,, G. Mechanical Science.

Notices of Communications intended to be read to the Association, accompanied by a Statement whether the Author will be present or not at the meeting, may be addressed to Professor Phillips, M.A., LL.D., F.R.S., Assistant-General Secretary, University Museum, Oxford; or to R. D. Darbishire, Esq., B.A., F.G.S., Alfred Neild, Esq., Arthur Ransome, Esq., M.A., and Professor Roscoe, B.A., Local Secretaries, Manchester.

Gentlemen desirous of attending the meeting will find in the Reception-room (The Portico, in Mosley-street) blank Forms of Proposal, and may make their choice of being proposed as Life Members, paying ten pounds as a composition, or annual subscribers, paying one pound annually and an admission-fee of one pound (making together two pounds on admission); or Associates for the Meeting, paying one pound. Ladies may obtain tickets, through the application of a member, in the Reception-room, price one pound each ticket. These tickets are transferable to other ladies only.

Home Correspondence.

CHARCOAL AIR-FILTERS.

Sir,—My attention has been drawn to a letter by Mr. Jasper W. Rogers, in your *Journal* for the 5th of July, on which I propose to make a few remarks.

The power of charcoal, especially of wood charcoal, to absorb and destroy gaseous emanations from putrifying matter, was never claimed by me as a discovery of my own. Previously to 1854, when I first published on the

subject, charcoal had always been described as possessing antiseptic properties, as could be seen by reference to any of the systems of chemistry published previously to that year. In my lecture at the Royal Institution, I quoted Professor Graham's Chemistry, 2nd edition, 1850, and the last edition of Turner's Elements, 1847. The same was also the opinion of Mr. Jasper W. Rogers, as will be seen from the following quotation, page 24 of my "Lecture at the Royal Institution," third edition, 1855. Having recommended the "covering of a burial ground to the depth of two or three inches with coarsely-powdered charcoal, to effectually prevent any putrid exhalations finding their way into the atmosphere," I also recommended "that charcoal should be introduced into all coffins, as it not only favours the decomposition of dead bodies, but prevents them from being injurious to the living." I then go on to state, that "I was not aware till very recently that Mr. Jasper Rogers, C.E., of Dublin, had proposed a similar application of peat charcoal some four or five years ago. Mr. Jasper Rogers' object was not merely to prevent the escape of effluvia, but to retard the decomposition of the bodies by means of the supposed antiseptic properties of charcoal."

It is plain, therefore, from the above quotations, that Mr. Rogers, as may be seen by his statements as published by the Irish Amelioration Society, believed in the antiseptic properties of charcoal, and that I had not so completely ignored his labours on the subject as anyone reading his letter of the 17th of June would be led to suppose. The only discovery which I claim in regard to charcoal is its oxidizing power, by which, from the large amount of condensed oxygen contained in its pores, amounting to between 9 and 10 volumes, it rapidly oxidizes the effluvia and miasmata emitted by decaying substances, and resolves them into the simplest combinations they are capable of forming, their carbon being converted into carbonic acid, and their hydrogen into water.

A knowledge of the oxidating property of charcoal naturally led me to the construction of the charcoal air-filter, which consists of pieces of charcoal varying in size from a filbert to a walnut, interposed between sheets of wire gauze, through which the impurities of the atmosphere are made to pass by filtration.

The invention of the charcoal air-filter is, it appears, also claimed by Mr. Rogers. The only proof of his claim with which he has favoured us, is a quotation from the Windsor paper of the 27th of October, 1849, in which he describes the deodorisation of a cesspool as follows:—"By a simple arrangement, Mr. Rogers placed a comparatively small quantity of peat-charcoal accurately granulated, resembling gunpowder in appearance, in such a position in contact with the wall as to intercept the gases as they rose, holding the charcoal in its place by a slight wooden boarding." Now I maintain that, on Mr. Rogers' own showing, this is no air-filter at all. In a filter, the gases must have the power of passing through and through the charcoal. He says that the peat-charcoal, in as fine grains as gunpowder, was heaped up against a wall, and supported, no doubt at the bottom, by a slight wooden boarding. It is clear, therefore, that the effluvia issuing from the cesspool under such arrangement, could not pass through the charcoal—the wall on which it rested would effectually prevent that—and that, therefore, the charcoal only acted by its surface attraction as charcoal had many years previously been known to do. Had Mr. Rogers covered over the cesspool with wire gauze, and then placed a layer of charcoal upon it so as to compel all the gases evolved to pass through the charcoal, as is now the invariable practice in such cases, that would have been to employ an air-filter, but to leave, as he did, the cesspool open, and merely to lay down a quantity of charcoal at the side of it, is not to employ an air-filter at all.

What I call upon Mr. Rogers to do, therefore, is to bring forward any printed statements dated previous to 1854, announcing the fact that charcoal is an oxidizer, and likewise that he will produce a published description of his air-filter of a similar date. Till he does this, I, for one, refuse to admit his pretensions.

In conclusion, I may mention that I have carefully read through Mr. Rogers' patent for peat-charcoal, dated 1848, and that neither the oxidating power of charcoal nor the air-filter is once mentioned in it. All charcoal filters, many hundreds of which have been applied to the sewers for some years past by the eminent engineers, Messrs. Rawlinson and Haywood, contain wood charcoal only in pieces of considerable size, from about a quarter of an inch to an inch in magnitude, for in truth it is not easy to conceive how it would be possible to disinfect the gases issuing from the sewers with air-filters containing granulated peat-charcoal of the size of grains of gunpowder, as Mr. Rogers asserts that he has done, without entirely obstructing ventilation. I am, &c.,

JOHN STENHOUSE.

17, Rodney-street, Pentonville, W., July 12th, 1861.

PRIZES FOR SKILLED WORKMANSHIP.

Sir,—I speak under correction, but shall we do quite right by giving prizes for graining or imitations of marbles, &c.? Had we not better encourage devices on wood or slate, so as to enrich them, and still let the material appear for those who want ornament beyond what the varnished surface gives. The common yellow deal is a beautiful wood when varnished, but pitch pine is gorgeous. Then, if there be no paint and putty, good work *must* be put in.

Those who do not think the above woods good enough, can use others. Do let us try to lead the people out of shams. I may be wrong, but I, having had a great deal to do with workmen of all kinds, have long thought that we can find amongst a hundred engine and machine fitters more really good men than amongst the same number of grainers or imitators. I think the truth of workmanship practised by the former has a tendency to elevate the mind. I am, &c., L.

Richmond, 15th July, 1861.

Proceedings of Institutions.

Barnstaple Literary and Scientific Institution.—The sixteenth annual report, presented to the annual general meeting, held March 27th, 1861, says that the past year has not been marked by any unusual features. The income from members' subscriptions, aided by the munificent annual contribution from Mr. Rock, has enabled every department of the Institution to be maintained in a proper state of efficiency; and in the appropriation of the income the council have endeavoured so to arrange the same as not to give undue prominence to any one department at the expense of others. The number of members has for several years past maintained an average, and in that respect this year shows but little difference from the preceding. There has, however, been a considerable increase each successive year in the demand for free membership, which the council have reason to believe is mainly caused by the increased facilities for class instruction offered by the Institution. There are at present 326 members, including 90 free members under Mr. Rock's foundation. The building of the Institution, which is rented for a long term of years on a repairing lease, is now in perfect order, a good deal having been expended on the repairs during the last few years. The council regret that the intention of the legislature to exempt literary institutions from the payment of local taxes has been frustrated by a technical flaw in the statute, and for the last year or two the local rates and taxes assessed on the Institution have formed a considerable addition to the rent and annual outlay. The establishment of the meteorological observatory in connection with the general system of observations throughout England, has proved a valuable feature, as it not

only assists the great end of the advancement of science generally, but gives a position to the Institution as one of the meteorological stations of England, and the only one within a circuit of forty miles. The observations are regularly and accurately taken from first-class standard instruments, by the librarian, under the superintendence of Mr. T. Mackrell and a small committee, and after being tested at Greenwich Observatory are published with the Registrar-General's Quarterly Report. The reading rooms are now amply supplied with daily and weekly newspapers and periodicals. The claims made upon the resources of the Institution by the other departments have again restricted the expenditure on the library; nevertheless a considerable number of books in all classes of literature has been purchased during the year, and on the whole the library is now in a most satisfactory condition, the number of volumes amounting to 4,910, the total issue for the past year having been 9,260. The plan of printing a catalogue of the books having been found, after the publication of two editions and several appendixes, not only costly, but of questionable utility, inasmuch as the latest compilation was, from the regular growth of the library, necessarily incomplete as soon as issued, the council have decided to substitute a single MS. catalogue, to lie on the library table, in which the title of every book will be entered alphabetically, with cross references. The student and general reader will thus be able at a glance to ascertain what books on any given subject are to be found on the shelves. A list of the books recently added, and which are always most in request, will be suspended in the library, and occasionally printed if it should be desirable. On the important subject of class Instruction the Committee report, that the courses which have been provided for the various classes have met with an average amount of appreciation, and have in some individual cases been pursued with untiring diligence and attended with marked success. Some of the results of the studies of the Drawing Class give evidence of great ability in the students, needing only assiduous cultivation to be fully developed. The average attendance has been eleven, and the conductor remarks, "there have been several very industrious pupils among them." Classes for the study of the French and Latin languages have been conducted with some success, but the teachers complain of the hindrance to the progress of the pupils resulting from their inability or indisposition to study at home in the intervals of class teaching. The results of the class would be much more satisfactory if future pupils could be induced to adopt this course, so that the time actually spent in class should be employed in testing their progress and guiding their course of study, rather than in the mere preparation of lessons. In addition to the foregoing, an Arithmetic Class hss been well conducted by the assistant master of the Wesleyan Day-school; and though the same faults have to a great extent characterised the attendance in this class as those before alluded to, a few young men have regularly attended, and good results have been obtained. The register of attendances in these four classes shows the following results:

	Pupils.	Lessons.	Average Attendance.
Arithmetic ...	20	30	9
Latin	11	31	7
French	15	38	8
Drawing... ...	20	39	11

On the subject of Lectures the Council cannot make a very satisfactory report. In the earlier stages of the Institution this department depended entirely on the gratuitous assistance of gentlemen resident in the neighbourhood, or occasional visitors, whose services for a few years proved eminently attractive, but it was found after a while that amateur lectures altogether failed to secure an audience. The Council then resorted to professional lecturers, with occasional musical and other entertainments, and these, at the commencement, attracted such large audiences as to necessitate the engagement of a larger room for their delivery, which also enabled the Council to appropriate the lecture-room as a reading-room, a step much required from the small size of the original first-class reading-room. It has, however, for the last two years, been found that the interest excited by this department is decreasing, and lectures or entertainments, even of the most attractive character, scarcely ever secure a full room. Furthermore, owing to the distance from London, and the lack of kindred Institutions in the neighbourhood who could unite in engagements, there has been found a great difficulty in inducing first-class lecturers to visit Barnstaple, and the terms of those who have been engaged are too high to render it possible to make their lectures at all remunerative. The report furnished by the Lecture Committee says that, "it is quite clear that the present system of engaging lecturers of assumed first-class position and high terms must be abandoned, and a smaller room, more frequent and less expensive lecturers engaged, and efforts made to enlist the services of amateurs.. The correspondence which the present Committee has had with lecturers, prove that the means of the Institution are not equal to engagements of first-class talent, and as a great difference of opinion exists on this subject, it is impossible to depend on securing for a gentleman of great attractions elsewhere, a large or paying audience in Barnstaple." The Council, with the greatest regret, announce the retirement of Mr. Chanter from the office of Honorary Secretary, which he has held with so much credit to himself and advantage to the Institution from the day of its foundation. Mr. J. G. King, who has for several years past given valuable assistance on the Class Committee, has kindly consented to accept the office. The abstract of accounts shows that the receipts have been £343 9s. 5d., and that there is a balance of £26 15s. 8d. in hand.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Num.

Delivered on 25th June, 1861.

360. Appointments to Offices—Return.
367. Public Accounts—Second Report from Committee.
198. Bills—Industrial Schools (Scotland) (Amended).
199. „ Church Endowment Act Amendment.
200. „ Church Rates Law Amendment (No. 2).
Schleswig-Holstein—Maps.
Sanitary Condition of Barracks and Hospitals—Report of the Commission.

Delivered on 26th June, 1861.

292. Loan Societies—Abstract of Accounts.
352. East India (Civil Service) Bill—Return.
353. Army (Military Reserve Fund)—Return.
191. Bill—Public Houses (Scotland) Acts Amendment.

Delivered on 27th June, 1861.

38 (5). Trade and Navigation Accounts (31st May, 1861).
359. Staffordshire Mining and Potteries Districts—Returns.
361. Navy (Iron Cased Ships)—Return.
205. Bill—Greenwich Hospital.

Delivered on 28th June, 1861.

336. Jersey—Return.
370. Scottish Universities—Paper.
376. Rags—Return.
381. War with Russia—Votes of Credit (Excess of Expenditure)—Statement.
382. Revenue Department—Non-Effective Charges (Excess of Expenditure)—Statement.
206. Bills—Industrial and Provident Societies.
207. „ Attorneys and Solicitors (Ireland) (Amended).
208. „ Book Unions.

Delivered on 29th June and 1st July, 1861.

356. Public Bills and Committees—Return.
324 (A. 1). Poor Rates and Pauperism—Return (A).
203. Bills—Crown Suits—Limitation.
209. „ Drainage of Land (as Amended by the Select Committee).
204. „ Copyright of Designs.
210. „ Labourers' Cottages (Amended in Committee, and on Re-commitment).
211. „ Inclosure.

Delivered on 2nd July, 1861.

346. Wexford Harbour—Return.
380. Transport Service—Report from Committee.
338. Chelsea New Bridge—Return.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED

[*From Gazette, July 12th,* 1861.]

Dated 16th March, 1861.

668. E. C. Morgan, Norwich—Imp. in protecting ships and fortifications.

Dated 20th March, 1861.

698. A. Symons, 63, Southwark Bridge-road—Imp. in apparatus for propelling and steering vessels.

Dated 25th April, 1861.

1038. R. Gray, Sheffield—Imp. in the mode of hardening and tempering crinoline, flattened wire, or sheet steel. (A com.)

Dated 2nd May, 1861.

1094. J. C. Wilson, 25, Bucklersbury—Imp. in the break or stopping gear of centrifugal machines.

Dated 13th May, 1861.

1216. A. C. Vautier, Charenton le Pont (Seine), near Paris, and M. Uzielli and Co., 9, Mincing-lane, London—Imp. in obtaining fibrous materials and paper pulp from various trees, shrubs, and plants.

Dated 18th May, 1861.

1276. F. O. Ward, Hertford-street, May Fair, Middlesex—Imp. in manufacturing manure and in obtaining accessory products.

Dated 25th May, 1861.

1322. E. H. C. Monckton, Parthenon Club, Regent-street—Obtaining and applying magnetic motive power, which invention is also applicable to other useful purposes.

Dated 30th May, 1861.

1346. W. B. Rooff, 7, Willow-walk, Kentish-town, Middlesex—Imp. in window seats for the prevention of accidents.

Dated 31st May, 1861.

1368. The Right Hon. Lord C. Beauclerk, Riding Manor House, Northumberland—Imp. in apparatus for propelling vessels.

Dated 5th June, 1861.

1412. M. Dodsworth and W. Smith, New Malton, Yorkshire—An improved boot and shoe-cleaning machine.

Dated 6th June, 1861.

1422. J. Wright, 42, Bridge-street, Blackfriars—Imp. in the method of and apparatus for separating foreign matters from the droppings from carding machines and for returning the residue thereunto. (A com.)
1428. J. Rust, Lambeth Glass Works, Carlisle-street, Lambeth, Surrey—An improved composition or preparation for hardening and preserving stone and cement.
1436. A. Smith, Hull—Imp. in drying, sweetening, purifying, and otherwise improving wheat and other grain, and in apparatus for the same.

Dated 7th June, 1861.

1440. W. Riddle, 1, Barford-street, Islington, and H. G. Coombs, 17, Union-street, Southwark—Imp. in shop-fronts.

Dated 8th June, 1861.

1462. J. Roman, Liverpool—Imp. for economizing fuel in evaporating and concentrating, chiefly applicable to the manufacture of chemicals and in the apparatus connected therewith.

Dated 10th June, 1861.

1484. C. F. Varley, 4, Fortess-terrace, Middlesex—Imp. in electric telegraphs.

Dated 15th June, 1861.

1534. H. J. Kennard, 36, Great George-street, Westminster—Imp. in apparatus for excavating sand and gravel under water.

Dated 18th June, 1861.

1558. R. Fell, 9a, Great Saint Helen's, London—Imp. in obtaining motive power and in apparatus employed therein.

Dated 22nd June, 1861.

1604. A. L. Le Harivel, 33, Tufnell-park-road, Upper Holloway—Imp. in the manufacture of paper papier maché cardboard and other similar articles.

INVENTION WITH COMPLETE SPECIFICATION FILED.

1693. J. F. Spencer, Newcastle-upon-Tyne—Imp. in steam engines and the machinery and apparatus connected therewith.—3rd July, 1861.

PATENTS SEALED.

[*From Gazette, July 12th,* 1861.]

July 12th.

116. A. G. Lasserre.
129. R. W. Swinburne.

[*From Gazette, July 16th,* 1861.]

July 16th.

133. G. Lewingdon.
149. R. M. Latham.
152. C. W. Lancaster, J. Brown, and J. Hughes.
173. R. Henderson.
181. W. Clark.
185. W. Wilson.
195. D. J. Fleetwood.
205. A. F. Yarrow and J. B. Hilditch.
239. C. E. Crawley and T. Schneider.
249. H. Phillips and J. Bannehr.
261. S. W. Warren.
271. J. J. De Arrieta.
333. C. While.
345. J. H. Johnson.
765. E. Briggs and S. Fearnley.
1143. G. Coles, J. A. Jaques, J. A. Fanshawe, & T. Galpin.
1279. B. F. Stevens.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, July 12th,* 1861.]

July 8th.

1545. W. Simons.
1547. J. Broadley.
1549. C. N. Kottula.

July 9th.

1591. J. Fowler, jun.

[*From Gazette, July 16th,* 1861.]

July 11th.

1565. N. Defries.
1626. W. Tasker, jun.

July 12th.

1613. J. Spence.

July 13th.

1634. T. Bailey.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, July 12th,* 1861.]

July 9th.

1512. G. A. Biddell.
1624. G. F. Wilson & G. Payne.

[*From Gazette, July 16th,* 1861.]

July 11th.

1558. T. Wright.
1569. J. Lockhart, jun.

June 13th.

1554. E. H. Brindley.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietors' Name.	Address.
4373	May 25.	Perpetual Vermin Trap	Colin Pullinger	Selsey, Chichester.
4374	„ 31.	Improved Piston for Brass Musical Instruments	Joseph Pimlott Oates	Erdington, near Birmingham.
4375	June 14.	Improved Angle Iron	Edward Peyton and Wm. Fothergill Batho	Bordeley Works, Birmingham.
4376	„ 17.	Davies's Improved Plough	Edward Davies	Higher Walton, near Warrington.
4377	„ 21.	Improved Muzzle and Sight-Protector for Rifled Guns	Thomas Turner	Fisher-street, Birmingham.
4378	„ 21.	Cottam's Noiseless Manger Shackle and Guides for Halter Rein	Cottam and Co.	2, Winsley-street, Oxford-street, W.
4379	„ 27.	Design for Sinks, Surface-gullies, Rain-spouts, and Closets, and their connections to Drains	J. G. B. Marshall	Rokeby House, Stratford, E.
4380	„ 27.	Improved form of Prism for Binocular or Stereoscopic Microscopes, Telescopes, and Cameras	John Benjamin Dancer	Cross-street, Manchester.
4381	July 2.	The Elcho Scarf	Thos. Harris Toms	Staining-lane, City, E.C.
4382	„ 6.	Three-Die Stock	Easterbrook and Allcard	Albert Works, Sheffield.
4383	„ 8.	Feeding Trough for Sheep and other Animals	Thos. Perry and Son	Bilston.
4384	„ 8.	A Clasp or Buckle	Thos. Bent Wilkins	Great Charles-street, Birmingham.
4385	„ 11.	The Elcho Firing Screen	Lord Elcho, M.P.	21, St. James's-place, S.W.
4386	„ 12.	A Sash Fastener	Joseph Downing	102½, Irving-street, Birmingham.

Journal of the Society of Arts.

FRIDAY, JULY 26, 1861.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £425,400, have been attached to the Deed.

The following Local Committee has been appointed in addition to those already published:—

ABERDEEN.

The Lord Provost, *Chairman.*
W. L. Reid, Esq., Advocate, *Hon. Secretary.*

The following arrangements, in addition to those already published, have been made in Foreign Countries and the Colonies to represent the interests of intending Exhibitors:—

AUSTRIA.

A Central Commission, for the furtherance of the purposes of the Exhibition, is appointed to hold its sittings in Vienna.

It will bear the title of "Imperial Royal Austrian Central Commission for the London Exhibition of Agriculture, Art, and Industry," and will alone be empowered to enter into communication with Her Majesty's Commissioners, in London, about matters relating to the Exhibition. Affiliated to it, as regards the Exhibition, are the several Chambers of Commerce throughout the Crown Provinces, and in matters of Agriculture and Art, the special organs that will immediately be appointed for the purpose.

The Chair of the Central Commission will be taken by the Minister of Commerce, and, in his absence, by the I.R. Regierungsrath and Professor Adam Ritter von Burg.

The members are:—

I.R. Sections-rath Adam Parmentier, representing the Ministry of Commerce.

I.R. Professor of the History and Archæology of Art, Eitelberger von Edelberg, representing the Ministry of State.

Hof-rath Ignaz von Rohonczy, representing the R. Hungarian Hof-kauzlei.

Hof-rath August von Roth, representing the Hof-kauzlei of Transylvania.

I.R. Ministerial Sekretär Utiesinovics, representing the Croato-Slavonian Hof-dikasterium; and, further,

Professor Dr. Arenstein.

Robert Hass, manufacturer in Neunkirchen.

Börsen-rath Anton Harpke, member of the Chamber of Commerce of Lower Austria.

I.R. Oberberg-rath, Otto Baron von Hingenau.

J. Reckenschuss, silk manufacturer.

Dr. Schrötter, I.R. Professor and Secretary of the I.R. Academy of Sciences.

Dr. Ferdinand Stamm, Secretary of the Society of Iron Masters in Austria.

J. B. Streicher, Vice-President of the Lower Austrian Chamber of Commerce.

Ernst Wertheim, Member of ditto.

Franz Wertheim, Vice-President of ditto.

Carl Zimmermann, merchant.

Dr. Edward Falb, I.R. Ministerial Sekretär, will act as reporter to the Commission.

NEW BRUNSWICK.

The Hon. A. E. Botsford, Sackville; J. G. Stevens, Esq., St. Stephens; Robt. Jardine, and Alex. Jardine, Esqrs., St. John's; H. P. Bridges, Esq., Sheffield; H. McMonagle, Esq., Sussex; Wm. Napier, Esq., Bathurst; and Michael Keaton, Esq., Sussex, have been appointed Commissioners.

THE MANSFELD COPPER-SLATE MINES IN PRUSSIAN SAXONY.

By W. P. Jervis, F.G.S., Mining Engineer.

(*Concluded from page* 623.)

6. Treatment of the Copper Residue of the Desilverizing Process (*Rückstände*).—The insoluble residue consists chiefly of oxide of copper, but although so large in proportion to the precious metal, were it not for time-honoured custom, I should feel some difficulty in deciding as to whether the copper was the principal metal in these mines, and the silver a valuable impurity, or whether silver were not the metal and copper an important secondary product. The black oxide of copper (*Rückstände*) is made up with 8 per cent. of clay, into balls about 6 inches in diameter, called *Batzen*, and spread out on racks arranged round a spacious drying chamber (*Trockenofen*). When this place is artificially heated, a day suffices to give consistency to the balls, but with a cold atmosphere four are requisite before they are ready to charge in one of the three little blast furnaces (*Brillenöfen*), similar in all respects to those already described for smelting the ores.

Kerl gives the following proportions:—

	Ctr.
Residue	53·30
Clay	5·33
Quartzose sand	4 to 5·00
Slag	8 ,, 10·00
Roasted matt (*Dunnstein*)	0·5 ,, 1·00
Again sand	1·00

Twenty-four hours' treatment with coke, and 0·076 *Ctr.* of fluor spar per *Ctr.* of matt, yields black or coarse copper (*Schwartz kupfer*) pretty free from arsenic and antimony, containing from 88 to 92, rarely 95 per cent. of copper, with 17 to 18 *Loth* of silver per *Centner*, and a matt *Dünnstein*, with 50 to 60 per cent. of copper, and 6 to 8 *Loth* of silver. That is:—

	Ctr.
Black copper	43·5
Matt	2·1
Slag	42·0

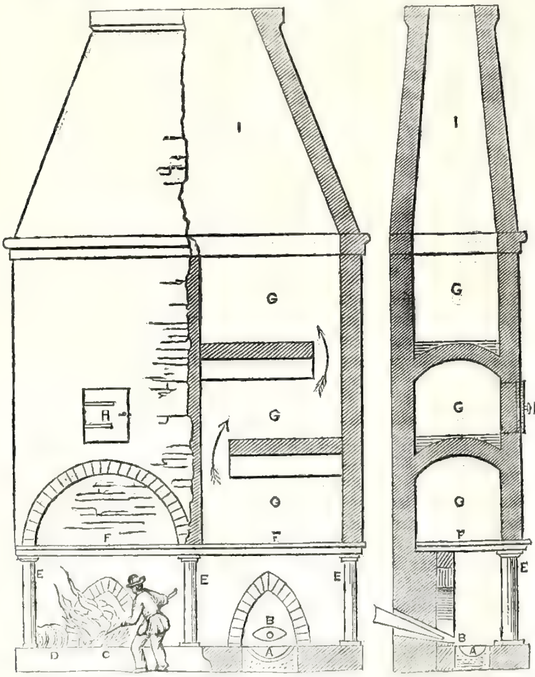
I find that Kerl states the loss of combustible in the Mansfeld furnaces to be 50 per cent; that is 41·2 in the formation of carbonic oxide, and 8·8 by the useless heating of the same. (*Handbuch der metallurgischen Hüttenkunde*; Article Fuel; Band 1, p. 151.) In 1856 the loss of silver per *Centner* of refined copper was 15·9 *Grän*, improvements introduced in the manipulation reduced that amount in 1857 to 14·28 *Grän*, (official MSS.)

7. Smelting the black copper and refining (*Gaarmachen*) (*Raffinierung*) is entirely carried on at the Saiger works at Hettstädt, either in hearths (*Gaarheerden,*) or as in England, in reverberatory furnaces (*Flammöfen*): these methods of manipulation constitute the only difference between what is sold as *Gaarkupfer* and *Raffinirtes Kupfer*.

a. The hearth is a simple hemispherical hollow 20 to 24 inches in diameter, on which a pair of bellows can play: 5½ to 6 *Ctr.* of black copper in fragments are thrown in, to which are gradually added 7⅛ to 8½ *Tonnen* of soft charcoal. When the blast is applied the sparks begin to fly about on every side, with a slight tinge of green from any vaporized metal. The object of the charcoal is to combine with any oxide in the black copper, which converts the carbonic oxide into carbonic acid, and after two or three hours

the metal is entirely liquified, and the refinery scum, (*Gaarkratze*) removed. The men quickly throw a bucket of water on the bath to cool the surface, and proceed with a thin shovel to lift off the thin plate of copper (*Schiebe, Rosette*) which has been consolidated; the temperature is not allowed to descend too rapidly, but just so as to give time for the successive removal of plates of metal; these are placed upright against the wall of the hearth to be annealed, and in case they bend forward, are at once beaten into shape with the iron rod. The whole of the copper is thus removed from the hearth with the greatest possible rapidity, to prevent the air from imparting its oxygen to the plates; notwithstanding which, a small proportion of suboxide at the surface gives the discs a lavender tinge. 110 to 120 discs of rosette copper are made from one basin of metal, the last being naturally very small. It is in this state that the copper is bought by the German smiths, who remove the suboxide themselves.

A considerable quantity of copper, mechanically carried up with the smoke, would be lost, but for the arrangement of soot chambers (*Flugstaubskammern*) over the hearth. The brickwork separating the hearth from the bellows, continued upwards, forms the back wall of the chambers. The front wall does not reach the ground, but is supported on short iron columns. Being open below, the vapour enters the first chamber, and is condensed on three horizontal partitions (*Zungen*), placed alternately right and left, but not reaching across. An iron door in front enables the men to sweep out the metalliferous soot, which is smelted.



W. P. Jervis, *ad. nat.* Scale $\frac{1}{120}$.

Mansfeld Hearth (*Gaarheerde*).

A, Basin. B, Bellows. C, Man engaged in removing the rosettes. D, E, Iron columns supporting the iron girders. F, G, Soot-chambers, seen in section. H, Iron door to sweep out the soot from time to time. I, Chimney.

b. The scum removed in this operation (*Gaarkratz*) is smelted at the same works in a blast furnace, producing *Gaarkratzkupfer*, and slags, invariably thrown away.

c. Gaarkratzkupfer is refined in a hearth, with two *Tonnen* of charcoal per *Ctr.* of copper. The product is inferior copper, called *Verblasenes Kupfer*. Lastly,

d. Verblasenes Kupfer is refined in a reverberatory furnace, or sent to the desilverizing works.

The total quantity of charcoal expended in all these processes per *Ctr.* of copper is 1,302 *Tonnen*, or 10.28 Prussian feet. When the copper is intended for the formation of alloys, instead of being made into rosettes it is poured into water as it is ladled from the hearth, to produce granulated or shot copper (*Granaillien*), in which state it is sold to the brass manufacturers.

7b. Refining in a reverberatory furnace is less expensive. 10 *Ctr.* are thrown in at a time. The operation lasts twenty-four hours. The furnaces are repaired every three to six weeks, and last for three or four years. The parts subjected to the highest temperature are built of English fire-bricks, brought over at a fabulous expense. German fire-bricks, made at Gerlebok, serve for the less heated portions. The exterior is, as usual, made of ordinary bricks, and firmly strapped together by bars of iron.

Refined copper receives various names in commerce, according to the shape and size of the blocks. Thus:—*Stang Kupfer, Gekeerptes Kupfer, Wurfel Kupfer, Barrn Kupfer, Blöcken Kupfer.*

The whole of the nickel ore is smelted at the Kupfer works at Sangerhausen in a single blast furnace, (*Krummofen*) differing chiefly in point of size from the *Schachtöfen.* The proportions are:—

Nickel ore, with admixture of calcareous and heavy spars	100
Fluor spar	5
Common clay	2
Sand	3 to 4

The sulphuric acid of the barytes, and the carbonic acid of the calcareous spar are liberated; the bases combine with a certain amount of silicic acid in the clay and sand, forming fusible bisilicates. Part of the arsenic in the ore is volatilized as arsenious acid, leaving 50 per cent. of a concentrated arsenide of nickel (*Speiss*) ready for the market.

For the few past years an attempt has been made to utilize the slag copper, or *Kratzkupfer*, for the manufacture of vitriols. The nickel, which it contains in considerable quantities, is made into nickel vitriol. Small quantities of selenium have also been prepared of late at the Gottesbelohnung works.

The Mansfeld Company work their own brown coal; the Riehstädt Emsloh colliery may be considered the best. The brown coal may there be obtained in any quantity desired within a short distance from the soil. From this mine 382,000 *Tonnen*, about 46,900 tons, were raised in 1859 by two engines, one of three horse-power, the other of six. In 1857 there were 34 pits in this district, employing 592 men, and producing 1,120,280½ *Tonnen* (about 137,600 tons), worth 154,505 *Thalers*, (£23,175), of which to the value of 146,818 *Thalers*, (£22,022), was employed. There are three qualities of coal: trunks of trees (*Stück Kohl*), blocks of blackish brown wood (*Knorpel Kohl*), and inferior coal, earthy or pulverulent (*Förder Kohl*) used for the boilers. The best brown coal is used as a fuel; inferior qualities are employed for distillation, in the manufacture of photogen, solar oil, and other products.

The Mansfeld miners are, on the whole, fine looking men, and not addicted to the baneful habit of drinking away all their earnings, leaving their families uncared for. The underground work is only carried on by a single set of men, from 6 a.m. to 2 p.m., so that in the afternoon the miners are seen in the neighbouring fields and gardens working for themselves, and in the evening all is quiet, for the small number of beer houses are not much frequented by this class of men. With the trifling pittance they earn, the men could not live at the present day, and support their families, especially as they generally marry shortly after getting out of their teens, were it not that most of them possess a small plot of ground, where they can grow their vegetables, and feed a couple of pigs, which supply them

in turn with pork, bacon, ham, and sausages. They can seldom afford to buy other meat, except during the great fairs.

Considerable *esprit de corps* exists amongst the Mansfeld miners and smelters. When they go to church they are obliged under penalty of fine to wear their own costume, and in case one of them dies a certain number of them are deputed to attend the funeral in full uniform. Nothing can be more imposing than the funeral of one of the higher officials. A short time ago, Herr Ulich, the smelting master at the Kupferhütte, Sangerhausen, who was much beloved, dying, in addition to all his men who turned out dressed in coats with red facings and white trousers, half the town attended the funeral, accompanied by a band. The captains and superior functionaries have a military frock-coat with brass buttons and epaulets, surmounted in winter time with a ponderous fur-trimmed cloak; a kind of shako with a feather, and a sword and dagger. Showy as this may be, it appears rather too gratuitous a waste of tinsel for our days.

Every miner and smelter is compelled to contribute to a common savings fund (*Knappschaftskasse*), for which a fixed sum is deducted from his wages, according to the class to which he belongs, and by which he is provided for in case of sickness or mutilation, and his widow and children supported after his death. May the writer be permitted to pause a moment in order earnestly to appeal to the British mining community on behalf of the general establishment of a similar institution among their men, having witnessed what a bond of union it produces between masters and men; indeed, the Mansfeld Company boasts of a gigantic family, whose members have no inducement to change their employment, led by motives of ambition or discontent.

PROVIDENT FUND AT THE MANSFELD MINES.

Class of Members.	Earning weekly.	Contribute weekly.	Receive when Disabled or Sick.		Widows receive.	Each child at death of father receives.	Each child at death of both father and mother.
	s.	s. d.		s. d.	s. d.	d.	s. d.
1. Captains (*Steiger, &c.*)...............	18	1 1¼	....	9 0	3 0	9	1 6
2. ,, ,, ...	12	0 10½	....	7 6	2 5	9	1 6
3. ,, ,, ...	9	0 6¾	....	6 0	1 10	9	1 6
4. All "tributers" whatever they earn	...	0 3¼	Under 42 years of age ... ,, 52 ,, ,, ,, 62 ,, ,, Above 62 ,, ,,	1 6 2 4 3 0 3 6	0 10¾	3¾	0 7
5. All day labourers except the youths	...	0 2¾					
6. Youths....................................	...	0 2	Receive a fixed amount.				

It is well known that every Prussian subject, male or female, is compelled by law, to learn to read and write; the remark, therefore, holds good with the Mansfeld miners. Schooling becomes a necessary item in the working man's expenses, but 3s. 9d. a year is so trifling that no one complains of the law of compulsory education. One old man remarked to me, that although he and his family were reduced to the lowest state of destitution, he willingly paid for the schooling of his children. The poorest man can also indulge in the luxury of a circulating library at the rate of 3s. a year, using as many books as he pleases. Unfortunately the kind of literature preferred seems to be of a flimsy character, chiefly translations from French novelists. There are such libraries at Sangerhausen and Hettstädt, and at least four at Eisleben, but the village of Helbra would seem to be the brightest social spot among the Mansfeld mines. Pastor Krumhaar has devoted his life to improve the taste and morals of the miners, and has introduced among them books of superior order. He showed me 400 books which he had purchased out of his salary, of which he stated that 100 circulate weekly in the village, where the miners eagerly embrace the opportunity of enjoying this gratuitous boon.

To Luther, it would appear by one of his letters to the Rathsherrn, is Prussia indebted for her earliest ideas on education. Before his time there were no schools in country places, and even in towns few for girls. If, therefore, we can recall to the recollection of the reader that the miner's son spent his life in overthrowing ignorance and error, and encouraging education among the masses, we may surely be pardoned for associating education for a few moments with the Mansfeld mines; we will therefore pass for a short time to the burgher school at Mansfeld, so interesting from the fact that where the miner's little children are now being taught, that great hero first learned to read.

The following is a programme of the studies:—

MANSFELD BURGHER SCHOOL.

	Hours.	MONDAY.	TUESDAY.	WEDNESDAY.	THURSDAY.	FRIDAY.	SATURDAY.
2ND CLASS, 8-11 years.	7– 8	Religious instruction.	Sacred history.	Bible reading.	Religious instruction.	Sacred history.	Bible reading.
	8– 9	Arithmetic.	Arithmetic.	German language.	Arithmetic.	Arithmetic.	German language.
	9–10	Writing.	Reading.	Singing.	Writing.	Reading.	Singing.
	1– 2	Geography.	History.	—	Geography.	Natural history.	—
	2– 3	Reading.	Writing.	—	Reading.	German language.	—
1ST CLASS, 11-14 years.	7– 8	Catechism.	Bible reading.	Sacred history.	Catechism.	Bible reading.	Sacred history.
	8– 9	German language.	German language.	Geometry.	Physiography.	German language.	Natural Philosophy.
	9–10	Arithmetic.	Arithmetic.	Drawing.	Arithmetic.	Arithmetic.	Explanation of the New Testament.
	1– 2	Caligraphy.	Singing.	—	Caligraphy.	Singing.	—
	2– 3	History.	Reading.	—	History.	Reading.	—
	3– 4	—	Geography.	—	—	Geography.	—

2ND CLASS.—Boys and Girls taught alike.
1ST CLASS.—Girls taught Needlework in place of one or two of the above subjects.

SOME STATISTICS OF THE MANSFELD MINES.

(Here first compiled from official data.)

Year.	Number of Men Employed in the Mines and Works, and of their Families depending on them for support.								Cost of Adits or Drainage Levels.		Production.					Value of Shares.	
	Miners.	Smelters.	Charcoal burners.	Total men.	Wives.	Families (total number of), supported by foregoing men, excl. of wives.	Invalid miners, widows and orphans supported by provident fund.	Grand Total.	Mansfeld basin alone.	Total inclusive of Sangerhausen.	Copper, (various kinds).	Fine Silver.	Copper vitriol.	Black vitriol.	Nickel Speiss.	Mean of the 5 Companies up to 1851.	Dividends.
									£ s. d.	£ s. d.	Ctr. lbs.	Mark. Gran.	Ctr.	Ctr.	Ctr.	£	£ s.
1830	...	...	...	...	..	...	...	...	... ...	... ...	... ...	16,601 0	1,126	...	...	1830—5... 72	1830-4 ... 33,446 14
1835	1,711	429	84	2,224	1,277	2,605	1,134	7,240	... ...	... ...	... ...	17,990 3	...	...	...	1836—7...156 1838—9...192	1835-9 ... 52,012 16
1840	1,836	499	68	2,403	1,519	3,091	1,250	8,263	1840 to 1844 } 30,094 9 11	1840 to 1844 } 33,540 14 11	... ...	19,570 82	...	...	...	1839-44...235½	1840-4 ... 65,664 0
1845	2,151	511	67	2,729	1,595	3,304	1,280	8,908	5,614 11 2	6,787 2 3	15,137 70	14,832 59	1,292	36	...	1844—5...418	15,724 16
1846	2,375	535	66	2,976	1,692	3,595	1,286	9,540	7,156 14 10	8,420 15 5	19,479 58	19,308 49	1,765	18	...	418	13,363 4
1847	2,415	605	64	3,084	1,730	3,388	1,248	9,456	6,025 2 7	7,399 3 3	19,761 29	20,001 28	830	20	...	418	17,337 12
1848	2,573	523	65	3,161	1,789	3,849	1,250	10,049	5,812 6 4	6,719 9 5	19,323 94	19,075 131	1,478	51	...	418	20,620 16
1849	2,576	515	67	3,158	1,813	3,707	1,225	9,903	5,344 9 8	6,692 3 6	14,203 0	13,743 232	770	37	...	{ 418 541	22,003 4
1850	2,589	529	65	3,183	1,832	3,830	1,226	10,071	6,929 14 0	8,364 11 11	19,948 20	21,233 123	381	26	...	541	33,120 0
1851	2,645	571	72	3,288	1,940	3,683	1,227	10,138	5,821 18 11	7,131 14 5	21,706 0	22,976 26	82	...	...	541	44,917 16
1852	2,600	584	74	3,258	1,989	4,062	1,201	10,510	4,768 16 10	6,618 14 11	23,576 0	27,749 153	7¼	...	...	...	41,817 12
1853	3,070	622	52	3,744	2,224	4,305	1,188	11,461	3,302 15 10	5,428 5 0	25,076 0	27,533 271	By treatment of the inferior Kratzkupfer.		...	progressing to	64,972 16
1854	3,110	632	20	3,762	2,237	4,517	1,180	11,696	3,682 14 1	5,627 15 6	25,696 0	33,596 256			409	...	69,811 4
1855	3,320	615	24	3,959	2,311	4,812	1,201	12,283	2,983 9 0	4,286 8 10	24,863 0	30,001 117	Copper vit. Ctr.	Nickel vit. Ctr. lbs.	290½	...	70,502 8
1856	3,498	629	42	4,169	2,414	4,981	1,203	12,767	4,591 10 6	5,216 2 0	24,472 0	29,182 69			230	...	73,267 4
1857	3,603	632	20	4,255	2,439	5,136	1,194	13,024	9,791 2 9	10,352 2 10	24,266 60	28,780 126	03$\frac{1}{10}$	213 106	315	...	55,296 0
											New *Zoll* Ctr.	New *Zoll* lbs.					
1858	3,697	679	116	4,492	2,571	5,284	1,210	13,557	12,181 16 6	12,593 5 11	25,984 61	12,837·119	219	111 46	118	...	55,560 0
1859	3,762	693	125	4,580	2,636	5,471	1,228	13,915	9,967 4 4	10,365 13 11	27,354 95	14,409·270	309	206	None.	825	34,560 0
									£124,068 17 3 length 9,688¼ *Lachter*	£145,544 4 0 length 11,652⅝ *Lachter*			831$\frac{1}{10}$	531 42			£783,998 2 or 5,224,894 *Thaler.*

TABLE

SHOWING THE GREAT ACCURACY OBTAINABLE BY THE YEARLY ESTIMATES OF THE MANSFELD COPPER-SLATE COMPANY, AS COMPARED WITH ACTUAL RESULTS, TAKING THE LAST FIVE YEARS.

Year.	Quantity of Copper Slate and Silicious Ore.		Cost of Mining, including Adits.		Quantity of Mineral to be Smelted.		Quantity of Refined and Rosette Copper to be obtained.		Quantity of Fine Silver to be obtained.	
	Estimate. *Fuder.*	Result. *Fuder.* *Ctr.*	Estimate. £ s. d.	Result. £ s. d.	Estimate. *Fuder.*	Result. *Fuder.* *Ctr.*	Estimate. *Ctr.* *lbs.*	Result. *Ctr.* *lbs.*	Estimate. *Mark.* *Gran.*	Result. *Mark.* *Gran.*
1855	16,474	16,680 56	67,369 13 6	74,615 15 6	16,039	15,849 8	25,000 0	24,863 0	27,271 121	30,001 117
1856	17,945	18,159 31	80,230 0 11	74,985 7 6	16,765	16,709 54	26,000 0	24,472 0	29,542 184	29,182 69
1857	17,560	17,004 57	79,514 3 6	76,638 2 9	16,895	15,330 2	27,469 94	24,266 60	30,172 0	28,780 126
							Zoll Ctr. *lbs.*	*Zoll Ctr.* *lbs.*	*Zoll lbs.*	*Zoll lbs.*
1858	17,410	18,570 19	89,855 19 1	82,236 13 0	16,720	14,726 56	27,342 68	25,984 61	13,542·528	12,837·119
1859	18,650	19,243 31	86,753 2 0	82,265 17 0	16,800	15,719 24	27,806 0	27,354 95	14,491·000	14,409·270
Total for 5 years.	88,039	89,659 14	403,722 19 0	390,641 15 9	83,219	78,335 24	or (about) tons. 6,681	or (about) tons. 6,347		

Mansfeld Coinage.

W. P. JERVIS, Ad. Nat.

REFERENCES TO COINS.

1. Silver new *Groschen* of the Counts of Mansfeld, coined at Eisleben in 1519.

2. Beaten silver-foil coin, or Bracteate, with the arms of the Counts of Mansfeld surmounted by the letter M, probably about the time of the Reformation.

3. Mansfeld dollar, 1522, with St. George and the dragon.

4. *Segen Thaler* of the kingdom of Westphalia under Jerome Napoleon, 1811.

5. Six *Pfenninge* copper coin, seventeenth century, coined at Eisleben from the copper obtained from the Mansfeld mines.

6. Prussian *Segen Thaler*, coined at Berlin from Mansfeld silver; Frederick William IV., 1847. 28 such *Thaler* contain one ancient Prussian pound of pure silver.

The more special education of those who aspire to becoming officials in the Mansfeld mines is carried on at the Mining School at Eisleben. Any intelligent miner may become a candidate, but the number of students admitted was reduced last year from 50 to 40, to prevent disappointment in procuring employment. The courses last three years.

Mining School, Eisleben.—Arrangement of Studies.

2nd Class, 1st Year.

	Hours weekly.
German language	2
Arithmetic	2
Drawing	2
Geometry and Trigonometry	2
Practical mining	2
Arithmetic during the winter; Levelling, &c. during the summer	2
Daily early visit to the mines	6

1st Class, 2nd Year.

2nd Division.

	Hours weekly.
Mathematics	4
Physics	2
Drawing	2
Levelling	2
Mineralogy	2
Mining (half of course)	6

Visit the mines three times weekly. During the session prepare minor theme on the Mansfeld mines and smelting works.

3rd Year.

1st Division.

	Hours weekly.
Mining Machinery	2
Drawing	2
Geology	2
Chemistry	2
Mining (half of course)	6

There are five teachers. The mining course lasts two sessions, commencing every alternate year; the yearly examination lasts one day; holidays during the month of September.

Quantity of Certain Materials Employed.

Year.	Charcoal.	Coke.	Coal.	Brushwood.	Fluor spar.
	Tonnen.*	*Tonnen.*	*Tonnen.*	*Schock.*	*Centner.*
1855	32,167½	102,067	5,949½	32,792	54,652
1856	36,269½	114,305¼	8,459¾	30,853⅞	59,676
1857	29,630½	112,102	7,781½	32 920¾	63,538¾
1858	30,684¼	103,271½	11,125¾	30,967¼	54,879¾
1859	30,676	111,683¼	8,776⅕	28 956 9/20	60,820¼

Value of Products Sold.

	Silver.			Copper.			Various secondary products.			Total sale.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
1855	61,068	9	6	142,361	9	6	914	7	3	204,344	6	3
1856	61,568	3	10	146,772	3	0	3,867	0	11	212,207	7	9
1857	58,785	10	2	154,220	6	1	4,793	15	6	217,799	11	9
1858	59,868	17	3	116.533	0	3	1,647	6	4	178,049	3	10
1859	64,468	3	7	165,181	18	0	1,141	12	11	230,791	14	6
	£305,759	4	4	£725,068	16	10	£12,364	2	11	£1,043,192	4	1

As the reader may not have time or desire to calculate any laws from the foregoing tables, I may just point out some very curious results. The value of the shares has risen from £72 in 1835 to £541 in 1850, and £825 in 1859. Taking a range of 15 years, the number of miners, smelters, and charcoal burners has annually increased about 125, their number has doubled since 1835, and now reaches 4,580. By including the invalided miners, it appears that 55 per cent. of the persons employed are married men. The increasing economy in the metallurgical operations, brought about by improved methods of treating the ore, has produced no less remarkable results on the sanitary condition of the men, as will be shown by the following summary I have worked out. In 1840 the number of individuals receiving support from the provident fund exceeded that in 1859, with an increase of 1,177 men. To every 100 able-bodied workers in these mines there were in

1832,	16	invalids	dependent on	the fund.
1833,	15	,,	,,	,,
1835,	14	,,	,,	,,
1838,	13	,,	,,	,,
1842,	10	,,	,,	,,
1846,	10	,,	,,	,,
1851,	8	,,	,,	,,
1853,	6	,,	,,	,,
1859,	5½	or, 1 : 3 as compared with 1832;		
		1 : 2 as compared with 1840.		

From the quantity of silver always obtained from the Mansfeld mines a mint was early established at Eisleben by the Counts of Mansfeld. They coined silver *Thaler* as far back as 1522, with the figure of St. George on horseback, striking the dragon, and the inscription, *Sanctus Georgius, patronus comitum dominorum in Mansfeld.* I have drawn a few of the Mansfeld coins, which are given in the preceding page. In later times *Segen Thaler* have been coined in Berlin from the silver purchased by the royal mint from the Mansfeld company; they bear the inscription, *Segen des mansfelder Bergbaues, i.e.*, the blessing, or boon, of the Mansfeld mines. I have given such a *Thaler* of the kingdom of Westphalia, under Jerome Napoleon, and another of the late King of Prussia, Frederick William IV.; they are very common pieces, the mint having made a contract with the Mansfeld Company to coin 50,000 annually. They are the only *Segen Thaler* in Prussia, although others exist in several of the German States.

FRENCH INDUSTRIAL EXHIBITIONS.

Four French Local Exhibitions are to be held this year at Chalons-sur-Marne, Metz, Nantes, and Marseilles. An endeavour is also making in Paris to get the Government to consent to the establishment of a permanent Universal Exhibition of Commercial Products. It is thought that by thus offering to purchasers from all countries the most complete and excellent collection of specimens and products for comparison, trade may be stimulated and business be drawn to France. Fixed prices attached, extensive publicity, simple and wise regulations, and great economy in the management, are held out as inducements to exhibitors.

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS.

(*Continued from page* 573.)

Western African Trade in Palm Oil and Palm-nut Kernels.—(Extracts from a Report by Dr. Baikie upon the Development of the Trade of Central Africa.)—Regular commerce in Western Africa has now been carried on by the English for fully 200 years, during which time their traders have confined their efforts almost entirely to the coast line, having rarely tried to advance at all into the interior; but having rested content with anchoring off the shores, or in the mouths of various accessible rivers, and there bartering home manufactures for tropical products with the natives.

The various commercial products fitted for European markets to be obtained at present from the countries bordering on the Niger, are, principally:—1, palm oil; 2, shea-butter, analogous to, but more valuable, than palm oil; 3, palm kernels; 4, camwood; 5, cotton of

excellent quality; 6, ground-nuts; 7, indigo: 8, gum; 9, pepper; 10, timber; 11, ivory; 12, hides. Of these, palm oil is of most immediate importance, the demand for it being so great, and its applications being so numerous, that a quantity double the present amount could even already be disposed of, while an active competition is now beginning to spring up in America, which will serve still further to enhance its value. Ground-nuts have hitherto been sent only to France, but the new American tariff will cause them to be largely imported into America. But the article to which I would specially desire to direct attention is the "palm kernel," only very recently introduced into trade, and as yet only imported into France; the value and importance of this embryo trade are so great, and the means of obtaining them now likely to be so ample, that too much attention can hardly be directed to them. On this and some kindred topics I beg to forward with this report the copy of a letter which I have received from Charles Heddle, Esq., of Sierra Leone, one of the most extensive, most enterprising, and most intelligent English merchants in Western Africa, whose opinions on all commercial questions relating to this country are most justly respected; and I send also copies of the Custom-house returns, on which the calculations are based. From this it will be seen that, in opening up the Niger, a trade can be established in this article alone, worth about £3,000,000 annually, and which would consume British manufactures to the extent of at least £1,500,000, besides the employment given to shipping and to others engaged in the manufactures. These kernels yield a most valuable oil, analogous in its properties and worth to cocoa-nut oil; besides which, the refuse forms an oil-cake of great agricultural use, not only as a manure, but possibly also as a food for cattle, which, to a country like Great Britain, must prove a great boon. Although cotton grows freely in Central Africa, still the demand, being extremely limited, the supply is necessarily very small, and before a lucrative trade or one of much importance can be established, some time must of course elapse; but the cotton being of good quality, it will be highly important that a fresh field be established for this invaluable commodity, so indispensable for our trade and manufactures. The whole of this interior trade particularly recommends itself, being a barter trade, and therefore not requiring money payment, and so absorbing the precious metals; but taking in exchange goods chiefly made at Manchester, Glasgow, or Birmingham, and so stimulating and promoting home labour.

INCLOSURE IN DR. BAIKIE'S REPORT ON THE DEVELOPMENT OF THE TRADE OF CENTRAL AFRICA.—MR. HEDDLE TO DR. BAIKIE.

Sierra Leone, May 8.

MY DEAR SIR,—In our conversation of yesterday, I observed to you that it appeared singular to me that among all the reasons urged on our Government to move it to renewed exertions to open the Niger to British enterprise, that which I hold to be the strongest and most unanswerable, seems entirely to have escaped the attention of the promoters of that great commercial measure. I allude to the vast extension which the trade in the rivers emptying themselves into the Bights of Benin and Biafra is about to take, and that almost immediately from the kernels of the palm nut becoming an article of export to Europe. You are aware that the palm oil now exported is entirely made from the fibrous pellicle that surrounds the nut, and that the kernels, with the exception of an insignificant quantity used for the manufacture of oil for domestic use, are thrown away.

The better to convince you of the value of these kernels, of the rapidity of the growth of the trade in them in our immediate neighbourhood and of its importance, I inclose you two returns; the first shows the quantity of kernels exported from this place from 1850 to 1856 inclusive, and the other that of the palm oil exported during the same period. In dealing with these returns, there are two things to be kept in view. The first is, that the return of kernels does not show the actual quantity exported from this place and its neighbourhood, but a somewhat close approximation to this is, however, necessary to arrive at the conclusion I have in view. You are aware that it is not necessary that vessels loading in the neighbouring rivers should clear at our Custom House; and it arises from this, that several cargoes go annually to France from the rivers, which do not therefore figure in our Customs' Return. From other sources of information, I am enabled, however, to estimate the quantity at all events which has been shipped during each of the last two years, and not included in the return, at about 60,000 bushels, which would raise the whole quantity exported from Sierra Leone, and those places in commercial dependency on it, to 150,000 bushels. On the other hand, the return of the palm oil exported, shows a considerable excess over the quantity procured and made in the adjacent rivers, that is, in the same localities as those from which we obtain the 150,000 bushels of kernels, arising from the fact that, during the last few years, a considerable trade is carried on with Lagos from this place by native traders, who bring their oil to this market for sale, and which, when exported, figures in our Customs' Returns. Some oil finds its way here from Liberia and other places to the south, and deducting these quantities which appear in the return of our exports of palm oil, I think the quantity actually made in our neighbourhood will be reduced to from 750 to 800 tons. I shall assume the first to be the correct quantity, and that 150,000 bushels of kernels is a fair relative proportion of kernels obtained in the manufacture of 750 tons of palm oil. On reference to the Customs' Return of kernels exported, you will perceive that the trade only dates from 1850; in that year only 4,096 bushels were exported. In 1852, or two years after, the exports had reached 46,727 bushels; and in 1856, 90,282 bushels. To all these years there is, of course, to be added the quantity shipped direct from our rivers to France.

Now, if among such a population, and in a country that cannot be considered as native to the palm tree, this trade has, in a few years, made such rapid strides, this habit of industry has gained so much on the people, that, during the past year, 150,000 bushels of kernels were collected and brought to market (to procure which, at least 350,000 bushels of palm nuts must have been stripped of the sarcocarp by the human hand, and subsequently broken, and the kernels separated from the shell and carried to a market many miles distant), thus giving, it must be admitted, a most emphatic demial to the often repeated assertion, that the negro will not labour except on compulsion, what results are we entitled to expect whenever this trade shall be generally introduced among the vast and industrious population that occupy the districts proper to the palm tree?

The quantity of palm oil imported into England from the west coast of Africa, in 1856, was estimated at 45,000 tons, to which we have to add the very considerable quantity exported to the United States, France, and Hamburg, and other continental ports, and which cannot be estimated at less than 5,000 tons, thus making the whole quantity exported from the west coast of Africa, 50,000 tons. Admitting, then, the 150,000 bushels of kernels obtained in the neighbourhood of Sierra Leone to be the fair relative proportion to the 750 tons of palm oil procured from the same localities, it follows that the 50,000 tons of oil should give 10,000,000 bushels of kernels, equal to 223,000 tons, worth, at the high price obtained for them in France in 1856, 89,520,000 francs, and we ought to arrive at nearly the same results in England. It has been ascertained that the average yield of oil from these kernels is 30 per cent.; the 223,000 tons should, consequently, give 67,000 tons of oil, worth, at the present price of cocoa nut oil, which it closely resembles in all its qualities, £3,350,000. If we add to this the value of the cake, 112,000 tons at the very low value of £4 per ton, we should obtain £448,000, making the whole gross value £3,790,000. The whole quantity of tallow exported from Russia in 1856 is esti-

mated at 2,574,121 poods, or 45,966 tons, which, at the present price of £55 per ton, would give £2,528,130. It follows, then, that the kernels now thrown away in the manufacture of the 50,000 tons of palm oil exported from Africa, are worth £1,216,870 more than all the tallow exported from Russia in 1856.

In estimating the value of this trade to Great Britain, there is to be taken into consideration a fact of the utmost importance, and which will render it more valuable whenever it is established than any other she is now engaged in; it is that our trade with Africa is entirely a barter trade; that whilst we pay Russia almost entirely in hard cash for her tallow, the whole value of these kernels will be paid for in British manufactures and colonial produce, while the transport of 223,000 tons of produce from Africa to England will give additional employment to that extent to her seamen and shipping. This question assumes still greater importance when taken from another point of view, that is, when we consider the effect this new industry must have, in the course of a few years, on the habits and well-being of the African. I believe that the degraded position he now occupies in the scale of humanity proceeds rather from the want of all occupation in early life, than from any other cause innate in himself.

The manufacture of palm oil, and the collection of such other produce as they can find a ready market for with the European trader, limited as it is by their limited knowledge of our requirements, can occupy but a small portion of the population, whilst the growth of their own food, in a country with a tropical sun and six months of tropical rain, affords employment only to a few women in each village, and occupies but a few weeks in the year. The rest of the population grow up in that unvaried idleness which, I believe, is the one great cause of their poverty, of their crimes, and of those frightful diseases that prostrate the physical and mental energies of a large proportion of them; whenever this population can be brought to occupy itself with the kernel of the palm nut, this state of things will immediately change. Every member of every family above the age of three years will not only have employment, but remunerative employment, during each hour of every day in the year. Thus the habit of labour will be created, and will bring with it other habits and new wants, and simultaneously with these wants, the means of ministering to them.

You may say that this trade has yet to be created. I grant it. But I have shown you the facility of its creation, and the rapidity of its growth amongst a people placed under the greatest possible disadvantages. The readiness with which the natives have betaken themselves to this new occupation has been fully illustrated in our neighbourhood. No portion of Africa, except its deserts, is more thinly peopled; the places from which we procure these kernels have, until the last two years, been annually decimated, nay, swept of their inhabitants, by the razzia of the slave dealer and their own cruel superstitions; the natives are, moreover, physically and mentally inferior to the tribes south of Cape Palmas; but in spite of all this, the trade has become what it is in the short space of four years.

Now, I have a right from this to assume that its growth will be still more rapid amongst those so much more favourably situated. If we wanted additional evidence of this, we have only to look at the marvellous progress of our present palm-oil trade. It scarce dates so far back as the present century; in 1808, the quantity imported into England was only 200 tons: in 1856, it reached 50,000 tons, and it is only during the last five years of this period that the steam vessel has come to the aid of African commerce. What, then, are we to expect in the next twenty years, when the distance between the oil-growing countries in Africa and England has, by steam power, been reduced by at least two-thirds, and when steam is about to be placed on the great artery of Africa, the Niger? Indeed, no country in the world affords such natural facilities for such a trade; the whole country is a network of natural canalisation. It commences at Cape St. Paul, and extends to beyond the Bonny, running parallel to the coast in its whole length, and extending hundreds of miles into the interior in every direction.

I remain, &c.

(Signed) C. HEDDLE.

INCLOSURE IN DR. BAIKIE'S REPORT ON THE DEVELOPMENT OF THE TRADE OF CENTRAL AFRICA.

Return showing the quantity of palm-nut kernels exported from Sierra Leone:—

	Bushels.
1850	4,096
1851	2,925
1852	46,727
1853	29,699
1854	25,399
1855	65,388
1856	90,282
Total	264,516

This return shows the quantity of kernels actually shipped at Sierra Leone, and omits those shipped at the rivers, but not entered at the Custom-house, which would increase the total amount by fully 60,000 bushels in 1856.

PORT OF FREETOWN, SIERRA LEONE.

Return showing the quantity of palm oil and palm-nut kernels brought into the port during the year ending December, 1856:—

	Lagos.	Windward Coast.	Sherbro'.
Palm Oil	520,800 gallons	38,393 gallons	118,245 gallons
Palm Kernels	181 bushels	17,620 bushels	82,847 bushels

(To be continued.)

EXAMINATION PAPERS, 1861.

(*Continued from page* 612.)

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in April and May last:—

TRIGONOMETRY.

THREE HOURS ALLOWED.

1. If (a) be the length of an arc of a circle, of which (r) is the radius, the number of seconds in the angle subtended at the centre by a, $= 206265\left(\frac{a}{r}\right)$.

2. The diameters of Jupiter and Saturn being as 87 : 79, and subtending at the earth angles 46″ 6 and 18″ respectively, compare their distances from the earth.

3. Find the sine, cosine and tangent of $\frac{\pi}{6}$, $\frac{\pi}{3}$, and $\frac{\pi}{10_8}$.

4. If (1) $3 \text{ Sec.}^4 A + 8 = 10 \text{ Sec.}^2 A$; find A.
(2) $2 \text{ Sin.}^2 A - 5 \text{ Cos. } A = 4$; find Cos. A. and Sin. A.

5. Prove the formulas:—
$\text{Sin.}(A + B) = \text{Sin. A. Cos. B} + \text{Sin. B. Cos. A.}$
$\text{Sin.}(A + B)\,\text{Sin.}(A - B) = \text{Sin.}^2 A - \text{Sin.}^2 B.$

6. If $\frac{\text{Sin.}(A - B)}{\text{Sin. B}} = \frac{\text{Sin.}(A + x)}{\text{Sin. } x}$ show that
$\text{Cot. B} - \text{Cot. } x = \text{Cot.}(A + x) + \text{Cot.}(A - x).$

7. Given $A = 18°$; $a = 4$; $b = 4 + 4\sqrt{5}$; solve the triangle.

8. If a, b, c, be the sides of a triangle, and C opposite c;
(1) $c^2 = a^2 + b^2 - 2ab \text{ Cos. C.}$
(2) $c^2 = (a - b)^2 \text{ Cos.}^2 \frac{C}{2} + (a + b)^2 \text{ Sin.}^2 \frac{C}{2}.$

9. Find the height of a hill, summit A, from the following observations:—Measure B C = 1,000 feet on a level plain, observe the angle A B C = 45°; the angle A C B = 75°, and from C take the elevation of A = 15°.

10. If a quadrilateral has two opposite angles, A and C, each a right angle, and S = ½ the sum of the sides a, b, c, d; then area = ½ (S − b) (S − c).

11. Every section of a sphere is a circle, and every oblique section of a cylinder is an ellipse.

12. Prove the formulas:—

(1) $\text{Cos. } a = \text{Cos. } b \text{ Cos. } c + \text{Sin. } b \text{ Sin } c \text{ Cos. A.}$

(2) $\text{Sin A Sin. } b = \text{Sin. B Sin. } a.$

(3) $\text{Sin.}^2 \tfrac{1}{2} c = \text{Sin.}^2 \tfrac{1}{2} (a - b) \text{ Cos.}^2 \frac{C}{2} + \text{Sin.}^2 \tfrac{1}{2} (a + b) \text{ Sin.}^2 \tfrac{1}{2} \text{C}.$

13. Find the area of a spherical triangle in terms of its angles.

NAVIGATION AND NAUTICAL ASTRONOMY.

THREE HOURS ALLOWED.

One question only in each Section to be answered.

I.

1. April 5th, 1861, at 10 h. 17 min. 23 sec. p.m. mean time, in long. 35° 30′ W. the observed altitude of Polaris was 42° 20′ 30″, index error − 2′ 14″; height of the eye 19 feet; find the latitude.

2. February 10th, 1861, at about 2 h. 16 min. p.m. mean time at the place of observation; in latitude 26° 10′ S., and longitude, by account, 90° 50′ W., when a chronometer showed 7 h. 1 min. 13 sec., the observed altitude of the sun's lower limb was 59° 7′ 50″, index error − 1′ 20″ height of the eye 16 feet; find the longitude. On February 1st, the chronometer was slow for Greenwich mean time 1 h. 17 min. 25 sec., gaining 2 seconds daily.

3. On March 19th, 1861, in latitude 27° 15′ N., and longitude 77° E., the sun had equal altitudes when the chronometer shewed 10 h. 15 min. 30 sec., and 2 h. 7 min. 20 sec.; find the error of the chronometer for mean and apparent time at the place of observation.

II.

1. Two places are on the same parallel of latitude; shew that

$$\frac{\text{Their dist. on the parallel}}{\text{Their difference of longitude}} = \frac{\text{Sine of half-dist. on a great circle.}}{\text{Sine of half their difference of longitude}}$$

2. Shew that the meridian distance in the middle latitude is nearly equal to the departure.

3. Prove: Difference of longitude × Cos. Middle-lat. = Dist. × Sin. Course.

III.

1. Prove: Meridional parts of the sphere =

$$\text{Log.}\left\{\text{Cot. half-colatitude}\right\} \times \text{M.}$$

2. The wind is N.N.W., and the ship can lie within 5 points of it; on reaching the harbour for which she was running it is found that the distance run on the port tack is ⅔ of that on the starboard tack; what was the direct course.

3. Shew how to find the position of a ship by observations of three known objects on shore.

IV.

1. Find the course and distance from A to B by middle-latitude sailing, and Mercator's sailing—

Latitude of A 33° 51′ S. Longitude of A 151° 18′ E.
,, B 55 59 S. ,, B 67 16 W.

2. Find the distance between the same places on a great circle.

3. A ship sails from latitude 57° 58′ N., longitude 7° 3′ E., W.N.W. 24, N.W. ½ W, 16, S.S.W. 31, S. ½ E. 12, and S.W. ¾ S. 20 miles, required the latitude and longitude arrived at.

V.

1. What are the principal adjustments of the sextant.

2. Give the principles of the division of the vernier.

3. Describe the observations for the determination of the index error.

VI.

1. Explain the difference between the mean solar day and the sidereal day; calculate the amount.

2. What is the time by a sidereal clock at Greenwich on June 5th, 1861, at 2 h. 30 min. p.m. Greenwich mean time.

3. A chronometer is slow on Greenwich mean time 5 h. 21 min. 45 sec., and gaining 3·7 seconds per day; what is its error 21 days later for mean time at a place in longitude 51° 30′ W.

VII.

1. Show how to find the time of a star's transit over a given meridian; give an explanatory figure.

2. Show how to compute the time of sunset; and that twice the time of sunset equals the length of the day.

3. Define the amplitude; how is it computed? Show how you compare the true and observed amplitudes to determine whether the variation of the compass is East or West.

VIII.

1. Shew how you find the latitude from simultaneous altitudes of two known stars.

2. Show how to compute the altitude of a celestial object for a given time.

3. Explain the method you commonly employ in clearing the lunar distance from the effect of parallax and refraction; and give your reasons for selecting it.

PRINCIPLES OF MECHANICS.

THREE HOURS ALLOWED.

1. What are the ascertained laws of cohesion and attraction? State any experimental facts which bear upon them.

2. State and prove the triangle of forces. Three forces in equilibrium on a particle are inclined to each other at angles of 60°, 135°, 165° respectively. Compare the forces.

3. Investigate the ratio of forces in equilibrium on the wheel and axle. The radius of a wheel is 6 feet, and that of the axle is 6 inches; find what weight will be supported by a power of 120 lbs., the thickness of the rope coiled round the axle being 1 inch.

4. State and prove the properties of Guldinus, and apply them to find the volume generated by the revolution of a right angled triangle, whose sides are 10 and 11 feet, around a line parallel to its hypothenuse and distant 6 feet from it.

5. A particle acted on by gravity rolls down a curve; show that the velocity at any point is that which would have been gained in falling freely down the corresponding vertical height. A stone with a velocity of 40 feet per second rolls from the top to the bottom of a quadrant, whose bounding radii of 20 feet are horizontal and vertical; find its velocity at the bottom.

6. Define centrifugal force, and estimate it in the case of a body moving in a circle. A weight of 56 lbs. is fastened to a string 3 feet long; how many revolutions per minute must be made that the string may be just stretched at the highest point?

Show how the centrifugal force of a railway train is overcome by the deviation of the wheels. Prove the formula for its amount, and apply it to the case of wheels of 3 feet in diameter, on a road 4½ feet wide, with a curve of 1,500 feet radius.

7. State the chief experimental facts ascertained with

regard to friction. What is the least force that will drag a cast-iron chest of a ton weight on an oaken floor? (Co-efficient of friction=·65.)

8. Find the time of oscillation of a simple pendulum. If half a turn be given to a bob of a seconds' pendulum on a screw of 30 threads to the inch, how much will a clock lose thereby in a week? Show that in a compound pendulum the centres of oscillation and suspension are convertible.

9. Describe Bramah's press. The plunger has a diameter of 2 inches, and is worked with a mechanical advantage of 4, by a power of 150 lbs. What pressure will be exerted by the table, whose cylinder has a diameter of 2 feet?

10. Explain the action and the defects of a hydraulic ram.

11. Show how the common hydrometer is used to compare the specific gravities of two fluids. The volume of a common hydrometer is $\frac{1}{20}$th of a cubic foot; the area of a section of its stem is $\frac{1}{8}$ square inch. In one fluid it sinks to within 3 inches of its top; in a second, to within 5. Compare the densities of the two fluids.

12. Describe fully the conical governor of a steam engine. Show that the distance of the slide from the top of the shaft varies inversely as the square of the speed.

13. What is "A unit of work"? Show that the work in a moving body is equal to half its *vis viva.* A train moving at the rate of 40 miles an hour comes to the foot of an incline of 1 in 300; the resistances are 8lbs. in a ton; how far will it go without stopping?

PRACTICAL MECHANICS.

THREE HOURS ALLOWED.

1. What is the measure of the work done by a force? How many units of work are accumulated in a railway train which weighs a hundred tons, and is moving at the rate of 30 miles per hour?

2. State the principle of the lever; give illustrations of the use of the lever in combination; describe some form of weighing machine.

3. Show that power may be gained by a combination of toothed wheels in a train, and explain the arrangement for producing a slow motion in a turning lathe.

4. Define a "screw surface," and the "pitch of a screw;" state some examples of the employment of the screw for transmitting longitudinal motion in machinery. Show how to determine the power gained by using an endless screw and worm-wheel. What is the construction of a "screw-jack?"

5. When a revolving axle is pressed upon its bearing by given forces, calculate the work absorbed by friction during one revolution.

6. Explain the action of a "mangle wheel."

7. Mention some instances of the use of water under pressure as a source of power for moving machinery; give an outline of the construction of Armstrong's hydraulic crane.

8. Solve the problem of obtaining a parallel motion for a beam engine.

9. In what manner is a locomotive engine reversed?

10. Explain Watt's Indicator, and state generally the mode in which it enables us to ascertain the actual working power of a steam engine.

11. How can screw-threads of various pitches be produced from one screw as a copy?

12. Upon what principle does Mr. Whitworth obtain a reversing motion with a quick return in his shaping machine?

ELECTRICITY, MAGNETISM, AND HEAT.

THREE HOURS ALLOWED.

1. Explain the term "lines of magnetic force;" how may they be exhibited?

2. How is the effect of an iron ship on its compass ascertained? And how may that effect be obviated?

3. By what means is the amount of the earth's horizontal magnetic force ascertained?

4. What do you consider the best method of magnetising a compass-needle?

5. Explain diamagnetism, and the means by which diamagnetic induction may be demonstrated.

6. What do you understand by the terms *positive* and *negative* electricity?

7. By what means are the *kind* and *quantity* of electricity in an electrified body determined?

8. Explain the electrical condition of an *insulated* body of elongated form placed *near* an electrified body.

9. By what means can you intensify minute charges of electricity, so as to render them perceptible? Explain the action.

10. State the phenomena observed when electrical currents of high tension are transmitted through exceedingly rarefied media.

11. What do you understand by the terms *quantity* and *intensity*, in relation to the action of a voltaic battery.

12. State the requisites of a telegraph battery, and the forms commonly employed.

13. Explain the cause of the rotation of a current round a fixed magnet, and the apparatus by which the fact may be best exhibited.

14. Explain the construction of Wheatstone's magnetic telegraph.

15. Construct a thermo-electric pile, and state its most important practical application.

16. State and explain the various modes of transmission of heat.

17. What is the temperature of the water in a locomotive boiler at 50lbs. pressure? If the boiler bursts, will the whole be converted into steam? Why so?

18. Show by quantitative experiments the amount of heat latent in water, on its changes of physical form.

19. What is meant by the mechanical equivalent of heat? state its amount.

20. State your reasons for or against the application of the undulatory theory to heat.

ASTRONOMY.

THREE HOURS ALLOWED.

1. Describe the astronomical telescope.

2. The latitude of a place being known, what are the boundaries of those stars which never set?

3. Distinguish between a mean solar and a sidereal day.

4. How is a star's place defined in the heavens?

5. What is meant by the right ascension of a heavenly body?

6. Give an account of the instrument by which the right ascensions of the heavenly bodies are determined.

7. Explain the adjustments of a transit instrument.

8. Describe the method of making transit observations.

9. Suppose the transit of α Arietis be observed over the seven wires of a transit instrument, as follows:—$19^s·3$; $33^s·1$; $47^s·0$; $0^s·8$; $14^s·8$; $28^s·7$; $42^s·7$, and the hour and minute by the clock at the last wire be 1 h. 58 min., what is the true apparent right ascension of the star,

The correction for	Collimation	error being	$+\ 0^s·30$
,,	Level	,,	$-\ 0\ ·07$
,,	Azimuth	,,	$+\ 1\ ·03$

The clock slow $45^s·42$ at the preceding 0 h. sidereal, with a losing rate of $1^s·60$ daily.

10. Suppose the transit of the 1st and 2nd limbs of the sun be both observed over the several wires of a transit instrument, as follows:—

1st limb at $20^s·0$; $33^s·8$; $47^s·6$; $1^s·5$; $15^s·1$; $29^s·0$; $42^s·9$; and the hour and minutes at the last wire be 16 h. 10 min.

2nd limb at $40^s \cdot 0$; $53^s \cdot 6$; $7^s \cdot 7$; $21^s \cdot 5$; $35^s \cdot 5$; $49^s \cdot 1$; $3^s \cdot 0$; and hour and minute at the last wire be 16 h. 22 min.

What was the sidereal time of the sun's diameter passing the meridian, and what was the true apparent right ascension of the centre of the sun?

The correction for Collimation error being $+ 0^s \cdot 31$
,, Level ,, $- 0 \cdot 22$
,, Azimuth ,, $+ 0 \cdot 49$

The clock slow $17^s \cdot 79$ at the preceding 0 h. sidereal, with a losing daily rate of $1^s \cdot 4$.

11. What is meant by declination, polar distance, and zenith distance of a heavenly body?

12. Give an account of the instrument by which the polar distance, the declination or zenith distance of the heavenly bodies are determined.

13. Describe the method of making an observation with the mural circle.

14. Suppose, in latitude 51° 28′ 38″·20, the sun's north limb be observed as follows:—Pointer reading 142° 0′, and the several microscopes 4′ 35″·5, 4′ 44″·8, 4′ 58″·9, 4′ 47″·3, 4′ 53″·2, and 4′ 45″·1, what is the true north polar distance of the centre of the sun? The reading for the zenith point being, 83° 31′ 26″·15; the correction for refraction being, 1′ 36″·16; and the correction for parallax 7″·31.

15. In latitude 51° 28′ 38″·20, the moon's calculated place in north polar distance was 110° 17′ 33″·49; her south limb was observed by the mural circle; the pointer reading was 156° 20′; the microscopes read 1′ 21″·0, 1′ 21″·6, 1′ 22″·1, 1′ 21″·7, 1′ 22″·0, 1′21″·8.

The reading on the circle, when the telescope was directed to the zenith, was . . . . . 83° 31′ 26″·15.
The correction for refraction . . . . 3′ 9″·52.
The correction for parallax . . . . 51′ 59″·49.
The calculated semi-diameter of the moon 14′ 53″·94.
What was the error of the place as calculated?

16. In latitude 51° 28′ 38″ β Ursæ Minoris was observed at its upper transit by the mural circle. The pointer read 60° 10′. The microscopes read 4′ 4″·8; 4′ 10″·0; 4′ 26″·8; 4′ 12″·7; 4′ 25″·2; 4′ 15″·0.

The reading for the zenith point was 83° 31′ 26″·15; and the correction for refraction was 25″·33. What was the true North Polar distance of the star?

17. Define the modes of measuring time.

18. Define the different kinds of years — tropical, sidereal—anomalistic.

19. Explain the nature of parallax, its variation, and the mode of finding it.

20. Explain the precession of the Equinoxes.

(*To be continued.*)

Proceedings of Institutions.

Oldham Lyceum.—The twenty-first annual report of this Institution says that it is now, to a gratifying extent, enjoying the prosperity its promoters have so long desired. The growing interest of the public in the Institution, the increasing number of members, and the cheering state of the finances, are matters of congratulation to all who are interested in a more complete development of its resources and a wider diffusion of its benefits. Those pecuniary difficulties with which the Lyceum has had to contend, are no longer the great obstacles to its proper and efficient working. There has been an average increase of members of all classes of 11 per cent., compared with the numbers for the year 1859, or a total increase of 80. The general average during the year has been 813. The elementary and advanced male classes show an average increase of 44. The other classes retain a very satisfactory position. The punctuality and attainments of many of the pupils are demonstrations of the efficient instruction which is imparted to them. The German class has been discontinued for want of pupils, but can be resumed when a sufficient number of persons present themselves. The subject of connecting a gymnasium with the Lyceum has been under the consideration of the directors, and they only await the necessary support to carry it into effect. Beneficial results are expected, and in some degree are already apparent, from the annual competition for those prizes which it is now in the power of the directors to offer to the pupils of the mathematical and mechanical drawing classes, through the generosity of John Platt, Esq., who has placed at their disposal the sum of ten guineas annually for this purpose. The thanks of the directors are also due to other gentlemen for their subscriptions to the general prize fund. Certificates and prizes were awarded at the local examination, in December, 1860, to females, for needlework, in which there were 6 candidates; to males, for mathematics, in which there were 14 candidates. There were also 7 candidates in mechanical drawing; 10 candidates in freehand drawing; 10 candidates in elementary arithmetic; and 22 candidates in writing from dictation and English grammar. Owing to the smallness of the room first selected for the library, the directors thought it expedient to remove to the more commodious room used for a reading room, and they believe that the alteration proves satisfactory. A large number of new and valuable works have recently been purchased. The number of volumes added during the year has been 351; and the total number of volumes in the library is 6,482. The total issues have been 18,740. The receipts have been £585 14s., and the balance in hand is £24 4s. 2d.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Num.

Delivered on 3rd July, 1861.

14 (1). Agricultural Labourers' Earnings—Further Return.
316. Derrymacash Riots—Return.
353. East India (Army Amalgamation)—Return.
375. European Forces (India) Act (1860)—Return.
212. Bills—Appropriation of Seats (Sudbury and St. Albans) (as Amended in Committee, and on Consideration of Bill, as Amended).
213. ,, —County Surveyors, &c. (Ireland) (Amended).
214. ,, —Inland Revenue.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, July 19th*, 1861.]

Dated 27th May, 1861.

1328. M. de Albytre, Bordeaux (Rue Laporte, No. 14), France—Imp. in tallow candles.

Dated 4th June, 1861.

1392. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—An improved combination of metals for the production of a white alloy resisting the action of vegetable acids. (A com.)

Dated 12th June, 1861.

1502. W. E. Gedge, 11, Wellington-street, Strand—An improved reaping and mowing machine. (A com.)
1510. J. Napier, Edinburgh—Imp. in stereotyping.

Dated 17th June, 1861.

1552. W. and J. Todd, Heywood, Lancashire—Certain imp. in power-looms for weaving.

Dated 20th June, 1861.

1586. M. F. A. T. de Menonville, 42, Rue Laffitte, Paris—Imp. in apparatus for ventilating furnaces, drying rooms, stables, kitchens, and other places.
1590. A. N. Lesueur, 78, Boulevart des Amandiers, Paris—Imp. in the manufacture of panels of ceramic or pottery ware.

Dated 21st June, 1861.

1598. J. Hannan and J. Hamilton, Glasgow—Imp. in indicators, such as are used for ascertaining the power developed by steam engines.

Dated 22nd June, 1861.

1606. J. Church, Upper Kennington-lane, Vauxhall—An improved stand or rest for pianofortes or other musical instruments.
1608. J. Comrie, Stirling, N.B.—Imp. in churns.

Dated 24th June, 1861.

1613. E. Dance, Bolton—A new or improved crinoline fastener.
1615. J. Ferrabee, Phœnix Iron Works, Stroud—Imp. in machines for fulling woollen and other fabrics and in the method of driving the same.

Dated 25th June, 1861.

1617. H. B. Barlow, Manchester—Imp. in knitting machinery. (A com.)
1619. J. Lafon, Bordeaux—Imp. in the production of chromo lithographic impressions upon glass, porcelain, and other similar material.
1620. L. Pierre, Niort, France—Imp. in the construction of iron windows or casements.
1621. W. Clark, 53, Chancery-lane—Imp. in apparatus for propelling vessels. (A com.)
1625. C. Stevens, 31, Charing-cross—An improved brick-making machine. (A com.)
1627. J. Brown, 12, Upper King-street, Norwich—Imp. in window frames and blinds.

Dated 26th June, 1861.

1629. S. Wenton, Lower Rosoman-street, Clerkenwell—Imp. in ventilating apparatus.
1631. J. Redfern, Hanley, Staffordshire—Improved apparatus for raising the temperature of air in order to warm churches, conservatories, houses, and other buildings or places.
1633. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—A new or improved construction of caloric engines. (A com.)
1634. J. R. Tussaud and F. C. Tussaud, Marylebone-road—Imp. in obtaining the separation of feathers, hair, or other covering from the skins of animals, and in securing such in position when separated.
1635. H. A. Fletcher, Whitehaven—Imp. in railway wheels and tyres.
1636. H. Coulter, Philadelphia, U.S.—Imp. in lamps specially intended to burn oils and other inflammable fluids rich in carbon.
1637. J. Higgins and T. S. Whitworth, Salford—Imp. in machinery or apparatus for spinning and doubling cotton and other fibrous materials.
1638. S. A. Bell, Epping-villas, Stratford, Essex—Improved machinery or apparatus for arranging and securing splints, tapers, or matches in frames preparatory to dipping.
1639. A. Lion, 51, Rue de Malte, Paris—Certain imp. in the fastening of bracelets.

Dated 27th June, 1861.

1641. Dr. F. Grimaldi, 60, Trinity-square, Borough—Imp. in rotatory steam boilers.
1642. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Imp. in cocks or taps for drawing off liquids, and in gauging apparatus connected therewith. (A com.)
1644. H. Coulter, Philadelphia, U.S.—Imp. in door springs. (A com.)
1645. H. Hamer, Horsforth, near Leeds—Imp. in chimney tops and ventilators.
1848. M. Henry, 84, Fleet-street—Imp. in the construction of a certain description of castor, and in apparatus for manufacturing certain parts of such castors, which apparatus may also be applied for producing rounded bodies for other purposes. (A com.)

Dated 28th June, 1861.

1649. J. Gibson, Todmorden, Yorkshire—Certain imp. in or applicable to sewing machines.
1650. T. Swinnerton, Dudley, Port Tipton, Staffordshire—A new or improved manufacture of coal gas by the surplus or waste heat of the blast ovens and puddling furnaces used in the manufacture of iron.
1651. A. Ford, Mortlake, Surrey—Imp. in the manufacture of waterproof felt.
1652. J. W. Harland, Chorlton-on-Medlock, Manchester—An imp. or imps. in the manufacture of wood and other types or substitutes therefor, and also in the matrix or apparatus for producing the same.
1653. J. W. Graham, Manchester—Certain imp. in machinery or apparatus for cutting, shaping, and dressing stone or other similar substances.
1654. H. J. Rouse, Alexandria, Egypt—An imp. in hand lamps.
1657. M. Lane, Reading—Imp. in the permanent ways of railways.
1658. C. Glassborow, Rheidol-terrace, Islington—Imp. in pianofortes.

Dated 29th June, 1861.

1660. Captain R. N. Eagle, America—Imp. in riding stirrups.
1661. J. Dyer, Islington—Imp. in the ornamentation of certain cabinet furniture.
1662. A. Wood, Lewes, Sussex—Imp. in the construction of fermenting tuns and apparatus for storing beer.
1663. W. Leopard, Hurstpierpoint, Sussex—Imp. in railway brake apparatus.
1667. I. Bragg, Hensingham, Whitehaven—An imp. in the construction of reaping and mowing machines.
1668. A. V. Newton, 66, Chancery-lane—Imp. in lapping used in machines for printing textile fabrics, part of which imps. is also applicable to driving bands. (A com.)
1669. W. Livesey, 3, Park-cottages, Park-village East, Middlesex—Imp. in wet gas meters.

Dated 1st July, 1861.

1670. W. Dingwall, Dundee—Imp. in fluid meters.
1674. L. H. Spence, Hatton-garden—Imp. in means or apparatus for the manufacture of paper bags or envelopes. (A com.)

Dated 2nd July, 1861.

1675. W. Barber, Stockport—Imp. in the manufacture of hats.
1676. S. H. Gerstle, Paris—Imp. in the manufacture of needle or tapestry work and coloured embroiderings.
1677. J. P. E. Paignon, J. M. Vaudaux, and G. Gagniere, Paris—Imp. in jacquard machines with the object of allowing the substitution of endless paper in lieu of the pasteboard pattern cards hitherto used therein, and in machines for perforating the said paper.
1678. J. Potts, Flint-street, Old Kent-road—Imp. in machinery for sounding fog bells and other bells.
1679. J. G. Wilson, Rastrick, near Halifax—Imp. in the means or apparatus employed for feeding steam boilers with hot water.
1680. A. Hill, Bamford Mills, Hathersage, Derbyshire—Imp. in spinning and doubling machinery.
1681. H. H. Bishop, Leicester-street, Leicester-square—Imp. in sewing machines.
1682. M. Henry, 84, Fleet-street—Imp. in or applicable to pianofortes and other musical instruments. (A com.)
1683. S. Adams, West Bromwich, Staffordshire—Imp. in omnibuses for street railways, part of which is applicable to other carriages.

Dated 3rd July, 1861.

1686. J. Terry, Birmingham—An imp. or imps. in the manufacture of window sash pulleys, side pulleys, screw pulleys, and upright pulleys.
1690. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in apparatus for grinding corn and other matters. (A com.)
1694. J. Petrie, jun., Rochdale—Imp. in machinery or apparatus for washing and drying wool, cotton, and other fibrous materials requiring similar treatment.
1696. V. C. Givry, Old Bond-street—Imp. in sewing machines. (A com.)

PATENTS SEALED.

[*From Gazette, July 19th*, 1861.]

July 19th.

3175. G. Dodman and W. Bellhouse.
158. F. W. Perrott.
164. H. Hibling.
167. C. W. Siemens and F. Siemens.
170. W. Cooke.
172. E. Ellis.
174. H. R. Cottam.
176. A. E. Holmes.
179. W. Westley.
180. W. Brown.
197. N. W. Dobson and G. Warren.
198. J. Vero.
203. J. Law.
214. J. Arrowsmith.
219. C. De Bergue.
236. W. Smith and M. Wasley.
256. C. Reeves.
262. I. Rodgers.
283. W. Clark.
286. J. G. Marshall.
321. W. M. Storm.
323. W. Morris.
390. J. Walker.
430. J. J. Miller.
433. W. E. Newton.
495. J. T. Pagan and T. B. Willans.
1130. W. Birks, sen., W. Birks, jun., and J. Birks.
1156. W. Birks, sen., W. Birks, jun., and J. Birks.
1232. J. Howard and E. T. Bousfield.

[*From Gazette, July 23rd*, 1861.]

July 23rd.

18. S. Perkes.
188. T. Haworth.
192. Col. H. D. O'Halloran.
194. T. Gibson, W. Knighton, and H. Knighton.
204. B. Lauth.
206. C. Lungley.
210. T. Bradford.
216. H. Bessemer.
218. J. Boulby.
223. G. A. Rothholz and M. Rosenthall.
228. J. A. Shipton.
238. E. A. L. Negretti and J. W. Zambra.
242. J. Mellor, jun.
268. J. M. Park.
272. A. V. Newton.
276. T. E. Knightley.
284. W. Clark.
302. J. Purdey.
309. W. Clark.
322. J. Branscombe.
330. J. L. Jullion.
334. J. G. Jennings.
516. J. Wilson.
652. F. Trachsel and T. Clayton.
656. J. Deakin.
1106. P. Wright.
1204. W. H. Tooth.
1264. A. Turner.
1288. O. Pappengouth and L. I. Lehmann.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, July 19th*, 1861.]

July 15th.

1716. J. F. W. Featherstonhaugh and F. Wise.

[*From Gazette, July 23rd*, 1861.]

July 18th.

1681. C. De Jongh.
1906. C. De Jongh.

July 19th.

1674. D. Adamson.
1677. J. Cooke.
1731. W. Hartley.
1765. C. De Jongh.

July 20th.

1640. W. N. Nicholson.
1651. D. W. Warder.
1656. J. B. P. A. Thierry.
1657. A. B. Tripler.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, July 19th*, 1861.]

July 15th.

1650. A. E. L. Bellford.

July 16th.

1755. P. G. Greville.

[*From Gazette, July 23rd*, 1861.]

July 20th.

1616. W. S. Losh.

Journal of the Society of Arts.

FRIDAY, AUGUST 2, 1861.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document.

Her Majesty's Commissioners have appointed the following Committee, in addition to those already published:—

Class I. (Mining, Quarrying, Metallurgy, and Mineral Products) in the coming Exhibition:—Sir R. Murchison, D.C.L., F.R.S.; Professor Warrington Smyth, F.R.S.; Professor Percy, M.D., F.R.S.; Professor Ramsay, F.R.S.; Professor Maskelyne, F.R.S.; Hussey Vivian, Esq., M.P.; Samuel Blackwell, Esq.; Nicholas Wood, Esq.; Thomas Sopwith, Esq., F.R.S.; R. B. Grantham, Esq.; and J. Rawson Barker, Esq.

The following arrangements, in addition to those already published, have been made in Foreign Countries to represent the interests of intending Exhibitors:—

Italy.

The following are the Commissioners:—

President: The Marchese Gustavo Benso di Cavour, Deputy to National Parliament.
Sir James Hudson, K.C.B., British Minister.
Cav. Rodolpho Audinot, Deputy.
Commander Tomaso Corsi, Ministry of Agriculture, Industry, and Commerce.
Cav. Giulio Curioni, Member of Institution of Lombardy.
Commander Stefano Jacini, Deputy, Ministry of Public Works.
Cav. Giuseppe la Farina, Counsellor of State.
Count Antonio Nomis di Pollone, Senator, Vice-President of Chamber of Agriculture and Commerce of Turin.
Cav. Professor Raffaele Piria, Deputy.
Marchese Cosimo Ridolfi, Senator, President of the Royal Academy of Georgofili.
Doctor Antonio Salvagnoli-Marchetti, Deputy.
Gregorio Sella, Merchant and Manufacturer.
Marchese Vincenzo Torrearsa, Deputy.
Professor Pietro Torrigiani, Deputy.
The Secretary of the Ministry of Finance.
The Secretary of the Ministry of Public Works.
The Secretary of the Ministry of Marine.
The Secretary of the Ministry of Agriculture, Industry, and Commerce.
Cav. Guiseppe Devincenzi, Deputy, will act as Secretary.

NOTICE TO INSTITUTIONS.

The Secretaries of those Institutions whose Members intend to join (with their friends) in the Excursion to the Crystal Palace, on the 27th inst., are requested to communicate with the Secretary of the Society of Arts without delay, stating the number of persons likely to be present.

EXAMINATIONS, 1861.

Since the publication of the list of prizes awarded to candidates,* the attention of the Council has been drawn to the fact that William Craig, to whom was awarded the first prize in Latin and Roman History, is ineligible for a prize, being an undergraduate of the University of Glasgow. The prizes for that subject will be awarded thus:—

1st prize of £5 to No. 814—Frederic Reeves, aged 20, Messrs. Chance's Library, Birmingham, Glass-cutter.

2nd prize of £3 to No. 38—Richard Edward Gent Kirk, aged 17, London Mechanics' Institution, Messenger in H.M. Record Office.

The former was originally the second prizeman, and the latter is the candidate standing next in order of merit on the Examiner's list.

The prize of £5 originally awarded to the Glasgow Institution, will thus be transferred to Messrs. Chance's Library and Reading-room, Birmingham.

NEW FRENCH TARIFF IN CONNECTION WITH THE LINEN AND JUTE TRADES.

By Robert Sturrock, Secretary to the Dundee Chamber of Commerce.

I.—The Linen Trade.

In noticing the changes which had been made in France in the import duties on linens and linen yarns (*Journal*, Vol. IV., p. 532), it was shown that under moderate duties a large business had sprung up, whilst, on an opposite policy being adopted, a flourishing trade was almost annihilated. In 1836 the tariff was reduced, and in 1842 excessive duties, amounting almost to prohibition, were established. The result has been thus:—

Linen and Linen Yarn Trade with France.

Year.	Linens.	Linen Yarn.	Total.
1835	£61,612	£198,823	£260,435
1841	281,982	806,336	1,088,318
1859	68,753	89,371	158,114

Under the Commercial Treaty lately concluded between France and this country, the linen trade has again obtained great advantages, the new duties being in some cases even lower than they were in 1836. This will be more clearly seen by showing the changes which have been made at different periods. Table I. gives the duty on the various classes of linen yarns in 1836, 1842 and under the new tariff, and exhibits at present prices the effect of these duties on different sizes of yarns. The only change now made in the classification of the tariff of 1842 has been to add one class, making six in place of five, the finest yarns being now entered in the sixth.

Table No. II. exhibits the duty on the different classes of plain linen cloth. From 1836 up to the present time, there were ten classes, but these have now been reduced to seven, and are consequently simplified.

Whilst the linen trade between this country and France has fallen to the low point already stated, the opposite has been taking place in that particular industry in France fostered by prohibitive duties. In 1840 there were only 57,000 spindles employed in flax spinning; in 1853 they had increased to 395,800, and though no official accounts have been since published, it is probable that the number now at work is fully half a million.

It may be too much to expect, under altered circumstances, that this country is again to succeed to so large a trade within a like period; but the market is again open. There is now a large interest to oppose, and the spinners in France by the new tariff have likewise advantages in getting machinery, coals, &c., from England, which they have not previously enjoyed; an active competition will also have the effect of producing greater care in the management of details, and curtailing expenses generally. The opportunity of fair competition is now, however, given,

* See present vol. of *Journal*, p. 508.

and there is little doubt the importance of the business will be such as to benefit the producer here, and the consumer on the other side of the Channel.

II.—The Jute Trade.

During the period that the extensive trade was carried on in linens and linen yarns between the two countries, jute yarns and jute manufactures were, comparatively speaking, little known here—1136 tons only of raw jute having been imported into Dundee in 1838—(in 1860 about 40,000 tons) and jute was not even recognised in the French tariff. The duties latterly imposed on jute yarns were so excessive and inconsistent with the nature and value of the article, that they must have been fixed either in total ignorance of what was being treated with, or it had been the determination of the French Government to exclude foreign yarns entirely. Unlike linen yarns there was no classification whatever; all descriptions were charged the same amount of duty on a like weight, which was fixed at 60 francs per 100 kilogrammes, or £2 8s. for 221 lbs., being nearly 2¾d. per lb. English. It is unnecessary to say more as to the total prohibition which such a system produced, than to mention that during the last six months of 1859, which was the period fixed upon by the French Government as a basis for the price valuations in the new Tariff, the above duty would have amounted to about 100 per cent. on the price of yarns adapted for sacking warps, and about 150 per cent. on wefts for the same manufacture.

Table No. III. shows the extraordinary change which has been made in the tariff just adopted, yarns being now classified according to their quality and value.

If the arrangement of the duties in connection with jute yarns showed great ignorance, it must be confessed that that adopted for jute manufactures betrayed much more. They were divided into four classes, but with the exception of the first no pure jute manufacture existed which could be placed in them. The first class, which admitted cloth up to 32 porter, 7 threads in one-fifth of an inch, or in 5 millimetres, was more than sufficient for all practical purposes, and the duty charged on 100 kilogrammes was 77 francs, or £3 1s. 8d. on 221 lbs., being 3⅓d. per lb. English. Under such a duty, the total exclusion of jute manufactures from France was thoroughly obtained; from the great alteration, however, which has been brought about, an immediate change must take place, and the details in Table No. IV. will best show what has been done on this head for the jute trade. As with yarns, a proper and natural classification has been well arranged.

As jute goods mixed with any other material—when the jute predominates in weight—are allowed to be entered as

TABLE I.—Tariff Duties of Brown Linen Yarns in 1836, 1842, and 1860.

	Class 1.		2.		3.		4.		5.		6.	
	No. 9 and under.		No. 10 to 19.		No. 20 to 39.		No. 40 to 59.		No. 60 to 119.		No. 120 and upwards.	
	Per 100 kilos.	Per 221 lbs.	Per 100 kilos.	Per 221 lbs.	Per 100 kilos.	Per 221 lbs.	Per 100 kilos.	Per 221 lbs.	Per 100 kilos.	Per 221 lbs.	Per 100 kilos.	Per 221 lbs.
	Frc.	s. d.	Frc.	s. d.	Frc.	s. d.	Frc.	s. d.	Frc.	s. d.	Frc.	s. d.
1836	14	11 3	24	19 3	24	19 3	24	19 3	24	19 3	24	19 3
1842	38	30 5	48	38 5	80	64 0	125	100 0	165	132 0	165	132 0
New Duty............	15	12 0	20	16 0	30	24 0	36	28 10	60	48 0	100	80 0

Examples of Tariff Duties on Brown Linen Yarns in 1836, 1842, and 1860, taking present Prices.
4⅙ Spyndles = 1 English Bundle.

	Class 1.			2.			3.			4.			5.			6.		
	6 lbs.—No. 8.			3 lbs.—No. 16.			2 lbs.—No. 25.			1 lb.—No. 50.			½ lb.—No. 100.			¼ lb.—No. 200.		
	Price per sp.	Duty per sp.	Per cent.	Price per sp.	Duty per sp.	Per cent.	Price per sp.	Duty per sp.	Per cent.	Price per sp.	Duty per sp.	Per cent.	Price per sp.	Duty per sp.	Per cent.	Price per sp.	Duty per sp.	Per cent.
	s. d.	d.		s. d.	d.		s. d.	d.		s. d.	d.		s. d.	d.		s. d.	d.	
1836	2 8	3¾	11½	2 4	3¼	11½	2 0	2	8⅓	1 4	1	6¼	1 5¼	½	3	1 6¾	¼	1⅓
1842	2 8	10	31¼	2 4	6¼	22⅓	2 0	7	29¼	1 4	5½	34½	1 5¼	3½	20⅓	1 6¾	1¾	9⅛
New Duty.........	2 8	3⅞	11¾	2 4	2⅝	9⅓	2 0	2⅝	11	1 4	1½	9⅓	1 5¼	1⅓	7¾	1 6¾	1 1/12	5¾

TABLE II.—Tariff Duties on Unbleached Plain Linens, in 1836, 1842, and 1860—Quality fixed by the Number of Threads of Warp in 1-5th of an inch, or 5 millimetres.

	Class 1.		2.		3.		4.		5.		6.		7.	
	8 threads and under.		9 to 11 threads.		12 to 14 lbs.		15 to 17 threads		18 to 20 threads.		21 to 23 threads.		24 threads and upwards.	
	Per 100 kilos.	Per 221 lbs.	Per 100 kilos.	Per 221 lbs.	Per 100 kilos.	Per 221 lbs.	Per 100 kilos.	Per 221 lbs.	Per 100 kilos.	Per 221 lbs.	Per 100 kilos.	Per 221 lbs.	Per 100 kilos.	Per 221 lbs.
	Frc.	s. d	Frc.	s. d	Frc.	s. d	Frc.	s. d.	Frc.	s. d.	Frc.	s. d.	Frc.	s. d.
1836	*33	26 5	65	52 0	*98	78 5	*142	113 7	*195	156 0	350	280 0	350	280 0
1842	*70	56 0	126	100 10	*172	137 7	*251	200 10	*320	256 0	467	373 7	467	373 7
New Duty...	30	24 0	55	44 0	90	72 0	115	92 0	170	136 0	260	208 0	400	320 0

* The average duty, the classification under these duties not being the same as now.

TABLE III.

Tariff Duties on Jute Yarn (Natural Colour).

	Class 1.		Class 2.		Class 3.		Class 4.		Class 5.	
	Heavier than 21 lbs. per sp. No. 2½.		21 lbs. to 8 lbs. No. 2½ to No. 6.		7 lbs. No. 7.		6 lbs. to 5 lbs., inclusive. No. 8 to No. 10.		4 lbs. to 2½ lbs. No. 12 to No. 19.	
	Per 100 kilos.	Per 221 lbs.	Per 100 kilos.	Per 221 lbs.	Per 100 kilos.	Per 221 lbs.	Per 100 kilos.	Per 221 lbs.	Per 100 kilos.	Per 221 lbs.
	Frc.	s. d.	Frc.	s. d.	Frc.	s. d.	Frc.	s. d.	Frc.	s. d.
Old Duty	60	48 0	60	48 0	60	48 0	60	48 0	60	48 0
New Duty	7	5 7	9·20	7 4	10·20	8 2	15	12 0	20	16 0

Examples of Tariff Duties on Jute Yarns—(Natural Colour)—Present Prices.
1 English Bundle = 4⅙ Spyndles.

	Class 1.			Class 2.			Class 3.			Class 4.			Class 5.		
	24 lbs. per sp. No. 2.			8½ lbs. No. 5⅝.			7 lbs. No. 7.			6 lbs. No. 8.			3 lbs. per sp. No. 16.		
	Price per sp.	Duty per sp.	Per cent.	Price per sp.	Duty per sp.	Per cent.	Price per sp.	Duty per sp.	Per cent.	Price per sp.	Duty per sp.	Per cent.	Price per sp.	Duty per sp.	Per cent.
	s. d.	s. d.		s. d.	s. d.		s. d.	s. d.		s. d.	s. d.		s. d.	s. d.	
Old Duty ...	4 0	5 2¼	130	2 1½	1 9	82½	1 9	1 6¼	87	2 0	1 3½	65	1 9	0 7¾	37
New Duty ...	4 0	0 7½	15½	2 1½	0 3½	13¾	1 9	0 3	14¼	2 0	0 4	16½	1 9	0 2⅝	12½

TABLE IV.

Duties on Pure Jute Goods—(Natural Colour)—Number of Threads of Warp in 1-5th of an Inch.

	Class 1.		Class 2.		Class 3.		Class 4.	
	Mending Bagging, Plain Sacking, Double Warp do., up to 14 por. 1, 2, and 3 threads.*		Twilled Sacking. 1, 2, and 3 threads.*		Hessians, &c., 4 and 5 threads, 15 to 22 porter.		6, 7, and 8 threads,† 23 to 36 porter.	
	Per 100 kilos.	Per 221 lbs.	Per 100 kilos.	Per 221 lbs.	Per 100 kilos	Per 221 lbs.	Per 100 kilos.	Per 221 lbs.
	Franc.	s. d.	Franc.	s. d.	Franc.	s. d.	Franc.	s. d.
Old Duty	77	61 7	77	61 7	77	61 7	77	61 7
New Duty.........	13	10 5	15	12 0	21	16 10	30	24 0

* In double warp cloth two threads are counted as one.
† In the old tariff the duty was under 8 threads, 77 fr., or 61s. 7d.; if 8 threads, 90 fr., or 72s.

Examples of Duties on Pure Jute Goods—(Natural Colour)—Present Prices.

	Class 1.												Class 2.			Class 3.					
	Mending Bagging.			Plain Sacking, 14 oz. per yard.			Double Warp Sacking, 14 oz. per yard.			Hessian 12 por. 40 in.			Twld. Sacking 1¼ lb. per yard.			Hessian, 16 por. 40 in., heavy.			Hessian, 18 por. 40 in.		
	Price per cwt.	Duty.	Per cent.	Price per cwt.	Duty.	Per cent.	Price per cwt.	Duty.	Per cent.	Price per cwt.	Duty.	Per cent.	Price per cwt.	Duty.	Per cent.	Price per cwt.	Duty.	Per cent.	Price per cwt.	Duty.	Per cent.
	s. d.	s. d.		s. d.	s. d.		s. d.	s. d.		s. d.	s. d.		s. d.	s. d.		s. d.	s. d.		s. d.	s. d.	
Old Duty...	19 8	31 2	158½	29 4	31 2	106	30 8	31 2	102	42 0	31 2	75⅓	29 0	31 2	107	50 10	31 2	61¼	53 0	31 2	59
New Duty..	19 8	5 3	26¾	29 4	5 3	18	30 8	5 3	17⅛	42 0	5 3	12½	29 0	6 1	21	50 10	8 6	16⅝	53 0	8 6	16

pure jute fabrics, the following will afford instances as how some of this description will now be affected :—

Class.	Mixed.	lbs.	Cost.	Duty.
			s. d.	s. d. Per cent.
I.—40 in. 14 por.	Hessian	112	53 2	5 3 = 10
II.—25 „ 8 „	Salt Sac.	112	68 6	6 1 = $8\frac{7}{8}$
II.—25 „ 14 „	do.	112	83 1	6 1 = $7\frac{1}{3}$
III.—40 „ 20 „	Hessian	112	70 10	8 6 = 12
IV.—24 „ 32 „	Padding	112	124 5	12 2 = $9\frac{3}{4}$

The duties on jute carpeting have also been reduced from 107 francs (85s. 8d.) to 32 francs (25s. 7d.) per 100 kilogrammes, or 221 lbs. English.

It will be thus seen that a radical change has been effected in the French tariff, so far as the jute manufactures of this country are concerned, and that there is now nothing in the shape of excessive fiscal duties to prevent a large business being carried on between France and this country. It may be stated, also, that all the duties will be further reduced in 1864.

Jute spinning is of late introduction into France—the total number of spindles now in operation being only from 12,000 to 14,000—and great varieties of jute manufactures are not yet produced. The sackings generally used there are of a more expensive description than ours, and it should only require time to show the farmers and other consumers that they can be supplied with an article which will suit their purposes equally well, and which they may procure at a reduced cost. The same may be said as to packsheet, carpeting, and many other fabrics of a mixed description.

A very large trade with France sprung up previously, on an alteration being made in her fiscal laws, and there is little reason to doubt but this will again take place after our neighbours become acquainted with the uses and prices of jute manufactures.

There may be various opinions as to the antecedents and present intentions of the Emperor Napoleon, but all must be satisfied that a commercial treaty with England was a wise measure on his part. He cannot but see that the continuance of his dynasty greatly depends upon increasing the comforts and general happiness of his people; and, knowing how advantageously free trade has worked for this country, he must be convinced that closer and greater commercial relations will produce a bond of union and good feeling between France and England which can never be brought about by any political treaty.

French Duties on Linen Yarns and Linens, and on Jute Yarns and Jute Goods.

Linens.

	Unbleached.	Bleached or Dyed.	Unbleached.		Bleached or Dyed.	
	Per lb.	Per lb.	Per 100 kilos.	Per 221 lbs.	Per 100 kilos.	Per 221 lbs.
PLAIN.	d.	d.	fr.	s. d.	fr.	s. d.
Under 37 porter (8 or less*)	1·31	1·74	30	24 0	40	32 0
37 to 49 porter (9, 10, and 11)	2·39	3·05	55	44 0	70	56 0
50 to 62 porter (12, 13, and 14)	3·91	5·23	90	72 0	120	96 0
63 to 75 porter (15, 16, and 17)	5·00	6·75	115	92 0	155	124 0
76 to 90 porter (18, 19, and 20)	7·40	10·01	170	136 0	230	184 0
91 to 100 porter (21, 22, and 23)	11·31	15·24	260	208 0	350	280 0
Above 100 porter (24 and above)	17·40	23·28	400	320 0	535	428 0
DRILLS, PLAIN OR FIGURED.						
Under 37 porter (8 or less)	1·52	2·05	35	28 0	47	37 7
37 to 49 porter (9, 10, and 11)	2·39	3·05	55	44 0	70	56 0
50 to 62 porter (12, 13, and 14)	3·91	5·23	90	72 0	120	96 0
Above 62 porter (15 and above)	5·00	6·75	115	92 0	155	124 0

* Number of threads of warp in 1·5 of an inch, or in 5 millimetres.

Linen Yarns.

	Unbleached.	Bleached or Dyed.	Unbleached.		Bleached or Dyed.	
	Per lb.	Per lb.	Per 100 kilos.	Per 221 lbs.	Per 100 kilos.	Per 221 lbs.
	d.	d.	fr.	s. d.	fr.	s. d.
No. 9 lea and under	0·65	0·87	15	12 0	20	16 0
„ 10 lea to 19 lea	0·87	1·17	20	16 0	27	21 7
„ 20 „ 39 „	1·31	1·74	30	24 0	40	32 0
„ 40 „ 59 „	1·57	2·09	36	28 10	48	38 5
„ 60 „ 119 „	2·61	3·48	60	48 0	80	64 0
„ 120 lea and upwards	4·35	5·80	100	80 0	133	100 5

Yarns and tissues of flax or hemp, mixed with other materials, will pay the same duties as pure yarns and tissues of flax or hemp, provided that the flax or hemp predominates in weight.

Damasks, 16 per cent. *ad valorem.*

Articles made of flax or hemp, wholly or in part made up, such as waggon sheets, railway covers, linen sacks, &c., 15 per cent. *ad valorem.*

This will apply to all qualities of made-up linens, and to mixed fabrics in all cases where linen predominates in weight.

Linen Yarns.

	No. or Lea.		Unbleached. Per sp. D.		Bleached or Dyed. Per sp. D.
1 lb. per sp.	50	=	1·57	...	2·09
$1\frac{1}{8}$ „	45	=	1·75	...	2·34
$1\frac{1}{4}$ „	40	=	1·96	...	2·61
$1\frac{3}{8}$ „	35	=	1·80	...	2·39
$1\frac{1}{2}$ „	32	=	1·96	...	2·61
$1\frac{5}{8}$ „	30	=	2·12	...	2·83
$1\frac{3}{4}$ „	28	=	2·29	...	3·05
2 „	25	=	2·62	...	3·48
$2\frac{1}{4}$ „	22	=	2·95	...	3·91
$2\frac{1}{2}$ „	20	=	3·27	...	4·35
$2\frac{3}{4}$ „	18	=	2·39	...	3·21
3 „	16	=	2.61	...	3·51
$3\frac{1}{2}$ „	14	=	3·05	...	4·10
4 „	12	=	3·48	...	4·68
5 „	10	=	4·35	...	5·85
6 „	8	=	3·90	...	5·22
7 „	7	=	4·55	...	6·09
8 „	6	=	5·20	...	6·96
9 „	—	=	5·85	...	7·83
10 „	5	=	6·50	...	8·70
11 „	—	=	7·15	...	9·57
12 „	4	=	7·80	...	10·44
13 „	—	=	8·45	...	11·31
14 „	—	=	9·10	...	12·18

$4\frac{1}{6}$ spls. = one English bundle.

Jute Cloth.

	Natural Colour.	Bleached or Dyed.	Natural Colour.		Bleached or Dyed.	
	Per lb.	Per lb.	Per 100 kilos.	Per 221 lbs.	Per 100 kilos.	Per 100 kilos.
	d.	d.	fr.	s. d.	fr.	fr.
*Up to 14 porter plain (1, 2, 3†)	0·56	0·83	13	10 6	19	15 3
*Up to 14 porter twilled (1, 2, 3)	0·65	0·96	15	12 0	22	17 7
From 15 to 22 porter (4, 5) ...	0·91	1·31	21	16 10	30	24 0
From 23 to 36 porter (6, 7, 8)..	1·31	1·91	30	24 0	44	35 2

Above 36 porter—more than 8 threads—same as tissues of linen, according to the class.

* In double warp cloth two threads are counted as one.
† Number of threads of warp in 1·5 of an inch, or in 5 millimetres.

Jute Yarns.

	Natural Colour.	Bleached or Dyed.	Natural Colour.				Bleached or Dyed.		
	Per lb.	Per lb.	Per 100 kilos.		Per 221 lbs.		Per 100 kilos.	Per 221 lbs.	
	d.	d.	fr.	c.	s.	d.	fr.	s.	d.
Heavier than 21 lbs.	0·31	0·43	7	0	5	7	10	8	0
21 lbs. to 8 lbs. inclusive	0·40	0·56	9	20	7	4	13	10	5
7 lbs.	0·44	0 65	10	20	8	2	15	12	0
6 lbs. to 5 lbs. inclusive	0·65	0 96	15	0	12	0	22	17	7

Finer than 5 lbs., for both unprepared and bleached or dyed, same class as linen yarns.

Carpets, rugs, and matting, per lb., 1·40d.—per 100 kilos., 32fr. = 25s. 7d.

Yarns and tissues of jute, mixed with other materials, in which jute predominates in weight, will pay the same duty as pure yarns and tissues of jute.

Mixed articles, wholly or in part made up, such as waggon sheets, railway covers, sacks, &c., provided the weight of the flax or tow yarns in them exceeds that of the jute, 15 per cent. *ad valorem.*

Yarns made from Manilla fibre and coir, 5 per cent. *ad valorem.*

Cloth made from Manilla fibre and coir, 10 per cent. *ad valorem.*

Jute Yarns.

	No. or Lea.	Natural Colour. Per sp. D.	Bleached or Dyed. Per sp. D.
3 lb. per sp.	16	2·61	3·51
4 ,,	12	3·48	4·68
5 ,,	10	3·25	4·80
6 ,,	8	3·90	5·76
7 ,,	7	3·08	4·55
8 ,,	6	3·20	4·48
8½ ,,	—	3·40	4·76
9 ,,	—	3·60	5·04
10 ,,	5	4·00	5·60
12 ,,	4	4·80	6·72
14 ,,	3½	5·60	7·84
16 ,,	3	6·40	8·96
18 ,,	—	7·20	10·08
20 ,,	2½	8·00	11·20
22 ,,	2¼	6·82	9·46
24 ,,	2	7·44	10·32
26 ,,	—	8·06	11·18
28 ,,	—	8·68	12·04
30 ,,	—	9·30	12·90
40 ,,	1¼	12·40	17·20
48 ,,	1	14·88	20·64

4⅙ spls. = one English bundle.

NEW SOUTH WALES AND THE EXHIBITION OF 1862.

The *Mechanics' Magazine* says:—"Two of the principal topics of conversation and debate among the inhabitants of New South Wales—and more especially of its capital—when the last mail left, were the best means of contributing to the Great Exhibition of next year, in London, and the designs for the new Parliament Houses to be erected in Sydney. With respect to the first, it is gratifying to find that the utmost unanimity of feeling existed, and that in the direction of having the colony fully and fairly represented, and its productive forces adequately demonstrated. It was emphatically urged that sufficient interest did not exist among the colonists in 1851 to make their contributions to the Hyde-park Palace of that date worthy of themselves or the occasion; and that they ought not to miss the opportunity which next year would present of remedying, as far as possible, the error. We must be permitted, also, to express a hope that these aspirations may be realised. Except in the matters of wool, tallow, and gold—their great staple products—the Australians were scarcely recognisable in the World's Fair in 1851; and yet there were many distinguishing features in connection with them which ought to have cast their reflex and left their impression among the host of attractions which immortalised that great display. During the last ten years the wealth, intelligence, and commerce of New South Wales and Victoria have advanced to a degree more than commensurate with that *decade* of their existence; and it is but fitting that the mother country should behold the tangible evidence of the well-doing of her children. That evidence may be, and we trust will be, furnished in the colonial courts of 1862. It should be shown, then, that besides the treasures which the fruitful earth yields to patient labour—besides those glittering and weighty nuggets which have excited the interest and the cupidity of the most remote inhabitants of the world—there are to be found in Australia other natural products, and specimens of art and handicraft, which are not unworthy of being represented in the New Temple of Manufacture, of Art, and of Science."

THE THAMES EMBANKMENT.

The Commissioners appointed to examine into plans for embanking the River Thames within the metropolis, so as to "provide with the greatest efficiency and economy for the relief of the most crowded streets, by the establishment of a new and spacious thoroughfare, for the improvement of the navigation of the river, and which will afford an opportunity of making the low level sewer without disturbing the Strand or Fleet-street, and also to report upon the cost and means of carrying the same into execution," have submitted to her Majesty the following conclusions and recommendations:—

"The nature of the inquiry entrusted to us was made known to the public by advertisement in the newspapers, and more than 50 designs were presented for our consideration. The main features of the majority of the plans are an embanked roadway on the north side of the river, and the formation of docks with the view to retain all the existing wharves; in others, railways in addition to the roadway and docks have been proposed; whilst in a few, a solid embankment and roadway without either docks or railways have been suggested.

"The wharf property between Westminster-bridge and the Temple-gardens is for the most part devoted to the coal trade. We find that great facilities are now afforded for the distribution of coal by the new system of unshipping in the docks into railway waggons, and by various depôts on the railways in and near the metropolis. We are of opinion that public convenience no longer necessitates the continuance either of the coal or any other trade in this immediate locality. We, therefore, think that it would not be expedient to construct and maintain docks for the sake of preserving the existing wharves between the points we have mentioned; whilst their removal will greatly simplify the formation of the embankment and add to the beauty of the river. The wharf property, however, between the Temple-gardens and Blackfriars-bridge cannot in our opinion be so treated; and that eastward of Blackfriars-bridge is so important in a commercial point of view, that we do not recommend any interference with it.

"Having regard to these and other considerations, we are of opinion that we shall best fulfil your Majesty's instructions and provide for the requirements of the public by establishing a spacious thoroughfare between Westminster-bridge and Blackfriars-bridge, by means of an embankment and roadway; and that the new thoroughfare thus created should be continued on eastward from Blackfriars-bridge by a new street, according to the line formerly laid down by Mr. Bunning, the City architect, from the west end of Earl-street across Cannon-street, to

the Mansion-house. Without such a street, no relief whatever would be given to the crowded thoroughfares of Ludgate-hill, St. Paul's-churchyard, and Cheapside.

"The line of embankment at Westminster would coincide with the terrace of the Houses of Parliament, and from thence to Blackfriars-bridge would nearly follow the line laid down for the corporation of the City of London in 1841 by Mr. Walker, Captain Bullock, Mr. Saunders, and Mr. Leach. The general level of the embankment and road would be four feet above Trinity high water. The road would commence at Westminster by an easy descent opposite the clock tower, and be continued on, 100 feet in width, to the eastern boundary of the Temple-gardens; from this point the road would be reduced to 70 feet in width, and carried on a viaduct supported by piers of masonry, rising to the level of Blackfriars-bridge, so constructed as to leave a breadth of water for the convenience of the City gas-works and the adjoining wharves of about 70 or 80 feet. The spaces between the piers under the ascending road would be left available for barges to lie, and afford easy access to the water between this structure and the wharves.

"From Westminster-bridge to the eastern boundary of the Temple-gardens, the embankment—sustained by a river wall—would be solid in its whole breadth; which breadth opposite Richmond-terrace would be 220 feet from the existing river wall. At Hungerford it would be 320 feet from the existing wharf; at Somerset-house about 120 feet; and at the Temple about 220 feet. The plan accompanying the report sets forth the entire scheme.

"With respect to the appropriation of the reclaimed land, we would recommend that as so much of it as shall be in front of the Crown property—which will be about 120 feet in width in the narrowest part—should be laid out in ornamental gardens for the accommodation of the occupiers of the houses, and that the portion in front of the Temple-gardens, also about 120 feet wide, be placed at the disposal of the society to be dealt with in a similar manner. The other portions of the reclaimed land may either be kept open for the health and recreation of the public, or be applied to building purposes.

"We propose that communications should be made with the intended roadway from Whitehall, opposite the Horse Guards, and also from some of the streets in the Strand; and that a new street should be formed passing through the Savoy to Wellington-street. The frontages on these streets would offer eligible sites for building, as would also the inner frontage of the new road, if it should hereafter be thought fit so to utilize the ground. We, however, feel it our duty to recommend that while economy and utility in laying out and disposing of the ground should be kept in view, endeavours should be made to invest this new and conspicuous work with some elements of interest and beauty.

"For the improvement of the navigation we recommend that the existing shoals between Waterloo and Westminster bridges should be removed, due regard being had to the foundations of the former. Also that an uniform low-water channel of six feet in depth at ordinary spring tides, and 500 feet in width from the embankment wall, be secured, and thus the stream be more equalised in velocity. If at any future time any effect should be produced on the river from the diminution of its capacity for tidal water by reason of the embankment, arrangements may be made higher up the river by dredging, or by a tidal reservoir to compensate for the loss. The consideration, however, of this matter would naturally devolve on the conservators of the River Thames.

"The embankment and street we have proposed will afford an opportunity of making the low level sewer without disturbing the Strand or Fleet-street, and at the same time facilitate the construction of the sewer eastward of the embankment.

"We are not prepared to recommend the construction of an embankment on the Surrey shore at present; but if hereafter it should be thought desirable or necessary to embank any portion of it, the scheme we have proposed for the Middlesex side will not in any way interfere with it.

"With regard to that part of our instructions in which we are commanded by her Majesty 'to report on the costs and means of carrying the same into execution,' we beg to report that we estimate the cost of the land, making compensation, constructing the embankment and roadways, and also acquiring the property in the City for, and forming the new street to the Mansion-house, at £1,500,000. This amount, however, would be reduced should it be thought right to dispose of any of the reclaimed land on the bank of the river for building purposes.

"Parliament having appropriated the coal dues to provide for the outlay necessary for this great work, it only remains for us to express our opinion as to the 'means of carrying the same into execution.'

"Looking at the magnitude of the work, the important and varied interests, both public and private, which will be affected, and the urgent necessity for its early completion, we are of opinion that the control and management of the undertaking should be entrusted to a special commission, appointed by your Majesty, in order to ensure speedy and economical attainment of an object so much needed by the public, and affording so favourable an opportunity for the improvement of the river and adornment of the metropolis.

"Witness our hands and seals, this 22nd day of July, 1861.

"WILLIAM CUBITT.
JOSHUA JEBB.
DOUGLAS GALTON,
EDWARD BURSTAL.
HENRY A. HUNT.
JOHN ROBINSON M'CLEAN."

EXAMINATION PAPERS, 1861.

(*Continued from page* 637.)

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in April and May last:—

CHEMISTRY.

THREE HOURS ALLOWED.

The candidate is not to answer more than three questions in each division.

1. A cubic foot of air was measured off at 80° F. and 31 inches barometric pressure. What will be its volume at 60° F. and 30 inches?

2. Describe the elementary bodies most nearly allied to chlorine in their properties. Also those most nearly allied to oxygen and nitrogen respectively.

3. How is a chemical compound distinguished from a mere mixture?

4. Describe the manufacture of oxalic acid, and its chief properties, especially the decomposition when it is heated with strong sulphuric acid, or with glycerine.

5. Describe the manufacture and purification of coal gas.

6. How is red phosphorus prepared? In what does it differ from the clear phosphorus?

Second Division.

1. Describe the properties and tests of antimony, and its distinctions from arsenic.

2. Describe and explain the smelting of copper. What impurities does that metal usually contain?

3. How is ammonia-alum manufactured? What are its uses?

4. How is the value of black oxide of manganese determined quantitatively?

5. Describe the manufacture and chief properties of ammonia.

6. What is the meaning of the word ammonium? Explain the constitution of salts containing it, and discuss the theory of their formation.

Third Division.

1. By what processes is glycerine prepared? Describe its composition and chief properties.
2. How is paraffin prepared from coal?
3. How are cotton fibres detected in wool?
4. Describe the formation of pure alcohol from sugar, and name the other products that are formed at the same time.
5. Describe the chief kinds of sugar, and their distinctive properties and tests.
6. How is fulminate of mercury prepared? What acids are isomeric with fulminic acid?

ANIMAL PHYSIOLOGY (IN RELATION TO HEALTH).

THREE HOURS ALLOWED.

The candidate should answer at least four of these questions, and include two of the questions numbered 3, 4, and 6.

1. Name any *four* of the elementary tissues of the animal body. Then describe any *one* of these,—giving an account of its microscopic structure, its chemical composition, its physical and vital properties, and the uses it serves in the animal economy.
2. Compare the movements of the knee and ankle-joints with those of the elbow and wrist. Describe the mechanism on which the differences in those movements respectively depend.
3. Give a short but methodical account of the phenomena which accompany muscular contraction,—noting especially the changes which occur and follow in the muscular fibre itself. Apply the knowledge thus educed to the answering of the following questions:—Why do the muscles tire? What are the effects on the muscles of over-exertion, of defective exercise, and of absolute inaction? Why is a due amount of exercise necessary to the healthy condition of the muscles?
4. What other parts of the body, besides the muscles, are benefited by muscular exercise? What are the benefits which they receive? Explain, in any one case you choose to select, the mode in which the benefit may be rationally accounted for.
5. What juices or secretions are added to the food during the process of digestion? Where are they so added? What are their respective actions on the food? How can we induce, as far as possible, their due admixture with the food, in proper quantity and quality?
6. What is the composition of atmospheric air? What are the various modifications produced in it by living animals, and what changes does it effect on them? Advance all the arguments you can in favour of the proposition, that man should breathe the purest possible air from the moment of his birth to that of his death,—by night as well as by day.
7. Enumerate the parts of the organ of hearing in fishes. Then mention in the order of their appearance, in reptiles, birds, and mammalia (including man), the parts which are successively added to produce an organ fitted for hearing in air, and the uses of those parts so far as we are acquainted with them.

BOTANY.

THREE HOURS ALLOWED.

The Candidate is expected to answer correctly six questions in Section I., and eight questions in Section II.; each answer in Nos. 11 *and* 12 *of the latter standing for one.*

Section I. (Vegetable Physiology.)

1. State the difference in structure between cellular tissue and woody fibre.
2. Describe the usual state of spiral vessels.
3. When plants are cut off from the action of light what is the consequence?
4. Explain the origin of roots.
5. By what means are roots enabled to perform the office belonging to them.
6. Describe the parts of any stamen as completely as you can.
7. Describe those of any pistil as completely as you can.
8. To what kind of elementary organs belong the following substances:—flax, hemp, cotton, and New Zealand Flax?

Section II. (Practical Botany.)

1. What is the difference between an umbel, a corymb, and a capitulum?
2. What do you understand by the terms flower and inflorescence?
3. Describe a dicotyledonous embryo.
4. What is albumen? And in what way does ruminated albumen differ from other kinds?
5. Name the three great classes into which the vegetable kingdom is divided and the sub-divisions of Exogens; also state in what manner they are known from each other.
6. How do Rosaceæ differ from Ranunculaceæ?
7. ,, Liliaceæ ,, Amaryllidaceæ?
8. ,, Graminaceæ ,, Cyperaceæ?
9. How is the genus Abies distinguished from Pinus?
10. How is Anthemis nobilis known from Matricaria chamomilla.
11. Name the four plants marked A, B, C, D, and state their natural orders.
12. Describe the plant A according to the forms given in "Descriptive Botany," chapter VII.

AGRICULTURE.

THREE HOURS ALLOWED.

I. Theory of Agriculture.

1. A piece of spongy platinum becomes red-hot in a jet of hydrogen gas, while a piece of solid platinum is unaffected by it. How does the experiment illustrate the fertilizing influence of tillage operations upon the soil?
2. Name the effects, beneficial and mischievous, which may follow the burning of the soil—well or ill-conducted.
3. Explain the increasing fertility of Great Britain, notwithstanding that its soil is annually washed by 3,000 tons or more of rain water per acre, which must carry much fertilizing matter off to waste. This you may do by enumerating the restorative or compensating influences at work in the case of any particular farm or field you know.
4. Explain the advantage of the covered home-stall—the advantage (*a*) of feeding animals, and (*b*) of making manure, under cover.
5. What are the advantages obtained by reducing green food to pulp and dry food to chaff, and mixing them before giving them in food to cattle?

II. Farm Practice.

1. In what circumstances is the "cultivator" or scarifier better than the plough as an implement of tillage?
2. Estimate the cost of steam cultivation, and describe the results of it in any case of which you know.
3. Name two or three rotations of crops in ordinary use, and state the circumstances under which they may severally be justifiable.
4. What is the best known remedy for the "finger and toe" disease of turnips—and how do you meet the case of land liable to the so-called "clover sickness."
5. Describe the ordinary cultivation of the wheat crop, stating the crops which it generally follows; naming the manures best adapted for it—describing some of the

best known varieties of the plant—and estimating the cost per acre of harvesting it by hand and by reaping machine, respectively.

6. Describe the cultivation of Kohl-rabi.

7. What methods of cultivation have been recommended as likely to diminish the liability of the potatoe crop to its "disease?"

8. Name some of the common artificial manures in use, the characteristic ingredients to which they respectively and principally owe their power, the crops to which they are severally best applied, and the quantity of each per acre that is ordinarily used in a dressing.

9. What quantity and kinds of food are you likely to give daily, during February or March, to an ox nearly ready for the butcher, and yielding probably eight or nine cwts. of beef?

10. What acreage of different crops (naming them) do you require on land of average quality to keep from year to year a flock of 300 ewes, selling their produce—the wether tegs fat (and weighing probably 20 to 25 lbs. a quarter) in early spring—and those of the ewe tegs not needed for the flock, along with the cull ewes about midsummer.

MINING AND METALLURGY.

THREE HOURS ALLOWED.

1. Give the formulæ of copper pyrites, malachite, red hæmatite and blende; state also in what localities, and under what circumstances, these minerals chiefly occur in Great Britain.

2. What are respectively the ordinary per centages of metal contained in copper, tin, lead, and iron ores, as prepared for the market in this country.

3. Describe the processes commonly employed for crushing and dressing copper ores in Cornwall.

4. What is the meaning of the word duty as applied to the pumping engine?

5. In what way are underground surveys conducted, and what are the instruments employed?

6. Give in detail the various processes employed for determining the commercial value of an ore containing lead, silver, and gold.

7. Name the important ores of zinc, and describe their metallurgic treatment by the Belgian process.

8. Describe the method of precipitating copper from cupreous solutions by means of scrap iron, and state the various chemical changes which take place during the operation.

9. Which is the most important ore of antimony, from whence is it chiefly derived, and how is it treated for the metal it affords?

10. Describe Pattinson's process for the desilverisation of lead.

POLITICAL AND SOCIAL ECONOMY.

THREE HOURS ALLOWED.

1. What are the different causes that determine the rate of wages, and which of them is the most essential?

2. What were the main objects and provisions of the Poor Law Act of Elizabeth? To what property did it apply, and have its provisions in this last respect been complied with?

3. What mischiefs was the Poor-Law Act of 1834 intended more especially to remedy? Has it been effectual for that purpose?

4. What, according to the last yearly return, was the whole amount expended in the relief of the poor in England and Wales, distinguishing out-door from in-door relief?

5. What are the colonial possessions of England, and their most important products.

THE FOLLOWING ARE OPTIONAL.

1. What is meant by the colonial system? How did it operate? And to what extent has it been abandoned?

2. What are the advantages and disadvantages of union rating, as compared with rating by parishes?

3. What do you understand by equality of taxation?

4. In what way is the justice of a uniform rate of income-tax proved on the supposition of its permanence? and is the proof conclusive?

DOMESTIC ECONOMY.

THREE HOURS ALLOWED.

1. Explain what you understand by domestic economy, and enumerate under different heads what you think it embraces.

2. For the site of a house what soils are best? What soil is the worst? What aspects are best, and what aspect is the worst, and give your reasons for your opinion?

3. A man earns 30s. per week, and has a wife and three children; viz., a boy of 16 and two girls of 11 and 8 years old. What accommodation should his house contain?

4. Explain the importance of ventilation. In ventilating a room, should the fresh air be admitted near the floor or near the ceiling?

5. Explain why ill-ventilated and crowded cottages are prejudicial to health; and give any reasons or proofs of this from your own experience.

6. Describe the various causes which make a chimney smoke, and the modes by which you would endeavour to cure it.

7. Which is most conducive to health, an uniform or varied diet? Give reasons and illustrations of your answer.

8. Of the modes of cooking—roasting, baking, broiling, frying, boiling, stewing. Explain each process briefly, and state which is the most economical.

9. Give a receipt for making bread. What is the effect of adding to the flour either potatoes or rice?

10. Should green vegetables be boiled in much or little water? Should the water be hard or soft? If it is deficient in the right quality of hardness or softness, how can the effect be cured?

11. Which is the more digestible or nutritious, fresh meat or salted? Why?

12. How may water in which there is a great deal of chalk or lime, be softened without adding anything to it?

13. Candles and Soap. At what time of year should a stock be laid in? Why? What precautions are requisite in storing them?

14. Detail the weekly expenses of a family, consisting of a man earning 18s. per week, his wife and four children aged 4, 6, 8, and 12 years, for food, fuel and light.

15. What, in your opinion, is the fitting qualification of a good domestic servant, as cook, as housemaid, as servant of all work.

16. With regard to the economy of a household, what do you consider are the advantages or disadvantages of town over country; and in the purchase of articles of clothing, how do you understand the terms *cheap* or *dear*?

17. In household management, what is meant (1) by necessary, (2) by current, (3) by occasional, and (4) by contingent expenses, and what things does each embrace?

18. What rules would you lay down to provide for them according to the circumstances and condition of a family, and for adjusting your expenditure to your income? What school knowledge would help you in this?

19. In what way would you vary your diet and clothing according to the differences of climate, the seasons of the year, the nature of your employment, or whether in town or country, and exemplify what you say by the habits of different peoples?

20. What are the causes of such wide differences in

home comforts as we often see amongst those whose earnings and pecuniary means are the same?

21. What are the advantages to a family of paying ready money and never running into debt; and the disadvantages of not doing so. And explain the necessity of keeping an exact account of income and expenditure?

22. How is the domestic economy of the labourer or operative affected by having part of his wages on a truck system, such as a dwelling rent-free; drink, as in the cider counties, as a part of wages throughout the year, or any other article of food on truck?

23. Do you consider a club for particular purposes, such us clothing, fuel, &c., when an equal or large proportionate sum is contributed by charitable people, beneficial or the contrary to the labouring classes?

24. What, in your opinion, is the best mode of disposing of small weekly or monthly savings, having regard to good security as well as interest?

25. Show how those who have to live by the labour of the hands or of the head—the industrial classes—can turn to best account casual intervals of time, not employed in their ordinary work (such as the long nights in winter,) as regards the economy and happiness of their homes.

26. Write your opinion on the influence which good household management has on the happiness of a family, and of the misery sure to arise from the contrary.

(*To be continued.*)

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS.

(*Continued from page* 634.)

Zanzibar.—The soil of Zanzibar is very rich, and peculiarly favourable to the cultivation of the clove tree, and supplies cloves in great abundance. The sugar cane grown at Zanzibar is of the very finest description. The late Imaum at one time worked his plantation well, and produced good sugar from a mill which was furnished with a steam-engine of English manufacture; but the engineers employed in working it all died, the engines got out of order, and no sugar has since been made on the island. Mr. Consul Sunley has commenced on the south side of the island, at a place called Pamoni, a very flourishing plantation of sugar, which grows luxuriously at Johana. Here I found a good anchorage for the *Castor*, and close by a harbour of deep water, formed by the coral reefs, where a three-decker might take refuge with safety.

Silk (Egyptian).—The large quantity of silk from the Barbary towns on the Mediterranean coast, or from any countries producing silk in Egyptian territory, is used at Illorin to mix with cotton in the superior cloths manufactured at that town, which have long been celebrated throughout Youraba and neighbouring countries for their softness and the gloss imparted by the silk; they are very expensive, and only chiefs, and others possessing wealth, can afford to purchase them. British manufactured goods find their way from one market town to another till they reach a kind of emporium at Illorin, from whence they are carried across the Niger into the heart of Africa. Rabba, or its immediate neighbourhood, would therefore be a very desirable site for commercial establishments connected with others at the confluence, and the safety of communication and travelling over land from Rabba to Lagos, which has now been established, would be found a great advantage.

Produce at Rabba.—Rabba is to be re-built very soon. If a permanent peace be established, the trade of that place will, in the course of a few years, surpass all your expectations; the yams are the finest we have ever seen, some weighing 45lbs., as white as flour, and as sweet almost as a potato. Dawa gero, mawa, and Indian corn are grown abundantly, and furnish—with yams, fish, and palm oil—the chief food of the people. I shall take you down specimens of the three first-named grains. Plantains, bananas, and popoys are the only fruit we get, and these are scarce.

The Republic of Liberia: its Products, Imports, and Exports.—From the swampy nature of the coast, timber is not to be found in the neighbouring settlements, but the elevated portions of the territory seem rich in gums and indigo. Timber of a superior quality and beautiful grain, and suitable for furniture, abound near the heads of the main river.

Its spontaneous productions—coffee, cotton, rice, pepper, palm oil, camwood, cassava, ginger, and arrowroot, need the attention of the husbandman. Only by agriculture can the Republic of Liberia become permanently important.

The imports into the Republic are cotton goods, earthenware, ironware, tobacco, spirits, provisions, powder, salt, wearing apparel, lumber, and miscellaneous articles, and (excepting tobacco, provisions, powder, and lumber, which arrive from the United States of America), are mainly of British manufacture.

The most important of the aforesaid are cotton fabrics, iron pots, iron bars, muskets, swords, hatchets, spear knives, brass kettles, brass rods, tobacco, spirits, and provisions.

The exports from the Republic are palm oil, camwood, ivory, and occasionally specie, of which the most important is the first-named produce.

All machinery, scientific instruments, books, horticultural and agricultural implements, seeds, specimens, and materials of every description used for the erection of school-houses or colleges are free of duty.

Diamonds.—In the official statistical report of the value of produce exported from Bahia, Brazil, an amount is included not exceeding £150,000, whereas an amount superior to £500,000 worth of this precious stone is clandestinely sent out of the country yearly. The discovery of the diamond mines in the district of Paraguassú, in the year 1845, has effected great and beneficial results to the population and commerce. What was in that year but a desert, is now one of the most flourishing districts, inhabited by a laborious and daily-increasing population. The town of Isabel de Paraguassú and neighbourhood contains 60,000 souls; that of Lençoés, 30,000; and Andarahy, 20,000—all the result of this discovery; and it may truly be said that those mines have realised for the poorer population of the interior, the same good we have observed in California and Australia. It has opened a large field to all, without dependence on professional skill or capital, of which the majority were not possessed; and in a moral sense has operated wonders in reclaiming the vicious from habits of indolence and crime. These men, finding in the extraction of diamonds an advantageous profit, naturally became large consumers of the produce of the country, which, for the want of a market, was not cultivated; and altering their habits of life, increased their well-being, and eventually made them consumers of the produce of foreign countries. The town of St. Isabel de Paraguassú is now the chief depôt of the trade of the north-west of this province, and supplies all the interior populations with the comforts of European civilisation, a population calculated at no less than 700,000 souls. In the neighbourhood of St. Isabel the cotton plant flourishes, and nitrate of soda is found—but the great difficulty to the exportation of these valuable products is the want of a good road to this port. Last year I used all my influence and endeavours with the late President to promote the passing of a law in the Assembly, guaranteeing five per cent. on the capital expended in the construction of a good carriage road. The law was passed and duly sanctioned by the late President, but, unfortunately, that law has been revoked. To give an idea of the importance of the road in question, it is enough to state that goods (foreign) to the value of £600,000 to £1,000,000 sterling are annually sent to the diamond district from this city, and that its exports in diamonds average between £600,000 to £800,000 per annum; no calculation being possible of

the value of cotton, nitrate of soda, hides, skins, cattle, iron, &c., &c., that would be sent down, had the road I had so strongly recommended been carried into execution.

Nitrate of Soda.—Nitrate of Soda in the neighbourhood of the River San Francisco, Bahia, Brazil:—I have the honour to acknowledge the receipt of your lordship's despatch of January 7 last, instructing me to report, after a careful inquiry, on the localities in which nitrate of soda has been found in this province, its state of purity, the cost of extracting and refining it, and the expense of transport to a shipping port. In reply I beg to state that ever since the mention made in my Commercial Report for the year 1856 of the discovery of this important manure in this province I have received undoubted information of its existence in several other localities, and in consequence lost no time in renewing my exertions, with the assistance of a few friends having connexions in the interior, to obtain every information possible thereon. The information received from several districts is such as to satisfy my most sanguine expectations, especially in the north-east of this province, in the neighbourhood of the River St. Francisco, at a place called "Salitre." In the words of a most distinguished and talented native of the town of Joazeiro, through a valley of sixteen to twenty leagues long, one mass of nitrate of soda is found; in some places on the surface, at others a few feet under; and it contains sufficient manure for exportation for years to come. On the opposite side of the above-named river, near the town of Pilao-Arcado, other deposits exist in equal quantities.

The projected Bahia railroad to the town of Joazeiro must pass through the first-named district, but those magnificent deposits will only become available when that railroad reaches the St. Francisco.

In the interest of the company and of commerce it is ardently to be desired that its works should be commenced and prosecuted with vigour, as the distance is only 240 miles from this city.

(*To be continued.*)

Home Correspondence.

CHARCOAL AIR-FILTERS.

Sir,—Not having read the *Journal of the Society of Arts* of the 19th, until to-day, I have not had an opportunity to reply to Dr. Stenhouse's letter appearing in that number.

Dr. Stenhouse now says, he maintains "that the arrangement made by me at Windsor, in 1849, was not an air-filter at all." He says it was "a quantity of charcoal heaped up against a wall;" that it is clear the effluvia issuing from the cesspool could not pass through, as the wall would effectually prevent that; and that had I covered the cesspool with wire gauze, and then placed a layer of charcoal on it, so as to compel all the gases to pass through, that would be a charcoal air-filter.

I confess I cannot comprehend why a charcoal air-filter is less an air-filter because the body of charcoal, through which the gases pass is held in position vertically rather than horizontally. But if the learned doctor's present position be true, his "charcoal respirators" are fallacies. The charcoal used at Windsor was situated as the charcoal is in the respirators, namely, vertically.

The editor of the Windsor paper says (and be it recollected it is his statement, not mine), "that I placed a comparatively small quantity of peat charcoal, accurately granulated, resembling gunpowder (that is, common powder, in large grains), so as to intercept the gases as they rose." That "the vitiated air passed through the wall" (which Dr. Stenhouse says "would have been effectually prevented by the charcoal), and blackened the paint of the doors;" and "that after the charcoal was placed in its position, it was felt as if there was a cool breeze in the house." Yet, according to Doctor Stenhouse, such an arrangement was not an air-filter. It is tolerably evident, however, that the air was perfectly purified.

The simple fact is, I placed the charcoal in the exact position necessary to intercept the fresh air as it entered the room, and, as the gases flowed through the interstices or vacancies between each grain, "accurately granulated," they were absorbed and oxidised. Precisely in the same manner the operation is effected in my process of filtering sewage water. The gases afloat are compelled to pass through granulated charcoal, and oxidation takes place. The same effect was produced during my public experiments at the London Mechanics' Institution, in October, 1849. I forced night soil into contact with granulated peat charcoal, by passing both together through a machine which brought them into intimate admixture, and within two minutes the gases were absorbed and oxidised.

If oxidation be not the action in all these instances, perhaps Dr. Stenhouse will explain what else it is. But if it is so, he will then be good enough to explain why he claims in 1854 and 1861, the discovery of facts which I promulgated in 1849.

As regards "publication" of these facts, he will only have to refer to several pamphlets, &c., issued by the Amelioration Society, which he admits he has already read.

If I prepared peat charcoal to produce these effects publicly in 1849, surely it was no discovery of Dr. Stenhouse in 1854, that air could be purified by means of charcoal. It is perfectly well known that at my lectures at the Mechanics' Institution, in 1849, and at the Royal Dublin Society, I exhibited fully explanatory diagrams of my "Peat Charcoal Filters" and "Effluvia Traps," as well as all the other means which I proposed for the sanitary improvement of towns by peat charcoal.

The following descriptions I now extract from one of the publications on the subject:—

"The Patent Peat Charcoal Effluvia Trap, for preventing the escape of odour from Sewers."

"The Patent Peat Charcoal Purifying Vase, for totally absorbing fœtid air in crowded apartments or sick rooms. Its effect is almost immediate in drawing to it the emanations from large assemblies of people, either in workshops or otherwise."

And let me now say that the purifying vase described, when made in due proportion to the area to be purified, and the peat charcoal properly prepared, will, solely because of the affinity which exists between the impure gases of the atmosphere and the peat charcoal, draw to itself those impurities without any other than the natural compulsion of that affinity. There is no need, as Dr. Stenhouse says, to "compel" them by other means.

I beg leave to send you herewith a copy of *The Sanitary Journal* of Dublin, which alludes to Dr. Stenhouse's statements when they first appeared in 1854; and I call upon that gentleman to point out any publication where the special uses and applications of charcoal for the purposes now under consideration were named by any one. It has nothing to do with the question to say that "Charcoal has been always described as possessing antiseptic properties, as may be seen by reference to any of the systems of chemistry." Every schoolboy almost knows that fact. But although every school girl was aware of the power which blew the lid off the tea kettle, it was long before science discovered how to apply that power.

I am, &c.,

JASPER W. ROGERS.

Peat House, Robertstown, Co. Kildare,
29th July, 1861.

Proceedings of Institutions.

Sherwood Mutual Improvement Society. — The eighth annual report of the committee states that the

members show by their attendance that they highly appreciate the advantages offered by the Institution's reading-room, which is now supplied with four daily and three weekly newspapers, and four weekly and two monthly periodicals. Five lectures were delivered during the last winter season, and a musical entertainment was given, the performers being entirely the members of the vocal music class and the Sherwood band. The entertainment gave great satisfaction to the members of the society, of whom and their friends over 500 were present. During the past year forty-nine volumes of attractive literature have been added to the library, making altogether the number of books in the library one thousand and forty-six. The books lent to the members during the year numbers 1,676, of which there were, of arts and sciences, 55; biography, 100; divinity, 22; history, 87; moral and descriptive, 105; natural history, 46; poetry and drama, 48; tales and novels, 786; voyages and travels, 44; miscellaneous, 383. A drawing class was established last autumn by the committee, and is still satisfactorily carried on. The music classes, both vocal and instrumental, also give great satisfaction. Mr. G. Payne has kindly placed in the charge of the Institution the photographic apparatus formerly belonging to the philosophical class, and now any member who wishes to study the science of photography can have the use of the apparatus. The balance sheet shows that the receipts have amounted to £199 10s. 0d., and that there is a balance in hand of £23 19s. 2d.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Num.

Delivered on 4th July, 1861.

351. East India (Mr. Reilly)—Return.
388. Post Office (Irish Mails)—Returns.
390. Caledonian Canal—Fifty-sixth Report of the Commissioners.
392. Army Prize Money—Account.
201. Bills—Cruelty to Animals Prevention (No. 2).
215. „ —Roads and Bridges (Scotland) (as amended by the Select Committee).
220. „ —Edinburgh University.

Redemption of the Stade Toll—Treaty and Protocols.
Turkey (Establishment of a Telegraphic Cable between Malta and Alexandria)—Convention.

Delivered on 5th July, 1861.

221. Bill—University Elections (as amended by the Select Committee and in Committee).

Statistical Tables relating to Foreign Countries, Part 7.

Delivered on 6th and 8th July, 1861.

389. Leinster Tolls, &c.—Return.
394. Mr Saxe Bannister—Papers.
396. Westminster Bridge, &c.—Returns.
401. Colonel Keogh's Petition—Report from Committee.
371. Steam Vessels—Return.
369. Education—Return.
377. Metropolitan Board of Works—Returns.
385. Merchant Seamen's Fund—Account.
386. Seamen's Savings Banks—Account.
387. Mercantile Marine Fund—Account.
397. Army (Effectives, &c.)—Returns.
405. Cunard, &c., Companies—Return.
406. Naval Reserve—Return.
407. Civil Services—Supplementary Estimate, Class 7.
366. Army (Medical Statistics, &c.)—Report.
216. Bills—Landed Estates (Ireland) Act (1858) Amendment.
217. „ —Landlord and Tenant Law Amendment (Ireland) Act Proceedings.
218. „ —Drunkenness (Ireland).
223. „ —Lunacy Regulation.
224. „ —East India (Civil Service) (as amended in Committee and on Re-commitment).
229. „ —Salmon Fisheries (Scotland, &c.) (as amended by the Select Committee).
225. „ —Turnpike Acts Continuance.
226. „ —Turnpike Trusts Arrangements.

Delivered on 9th July, 1861.

378. Civil List Pensions—Return.
219. Bills—Markets and Fairs (Ireland) (as amended by the Select Committee).
227. „ Conjugal Rights (Scotland).
228. „ Trustees (Scotland).

Delivered on 10th July, 1861.

395. Mail Steamers (North America)—Return.
399. National Portrait Gallery—Return.
402. Public Income and Expenditure—Return.
403. Licensing System (Scotland)—Paper.
413. Railway and Canal Bills—Tenth Report from the General Committee.
230. Bills—Officers of Reserve (Royal Navy).
231. „ —Portpatrick Harbour (Scotland).
232. „ —Naval Medical Supplemental Fund Society (as amended by the Select Committee).

Cambridge University Commission—Report.

Delivered on 11th July, 1861.

384. Metropolitan Board of Works—Return.
401. Colonel Keogh's Petition—Report from Committee and Minutes of Evidence.
233. Bills—Salmon and Trout Fisheries (as amended by the Select Committee).
236. „ —County Voters (Scotland) (as amended in Committee and on Re-commitment).

Delivered on 12th July, 1861.

411. Navy (Boats)—Return.
415. Education (Building Grants)—Return.
417. Westminster New Palace—Returns.
418. Public Accounts—Third Report from Committee.
419. Public Income and Expenditure—Account.
374. East India (Army Medical Department)—Return.
234. Bill—Drainage of Land (as amended by the Select Committee).

Public General Acts—Caps 21, 22, 23, 24, 25, 26, and 27.

Delivered on 13th and 15th July, 1861.

323. Public Accounts—First Report and Minutes of Evidence, &c.
423. Colonial Military Expenditure—Report from Committee.
400. Ramsgate Harbour—Abstract of Accounts.
416. Maynooth College—Paper.
420. Civil List Pensions—Paper.
421. Reformatory Schools (Ireland)—Return.
265. East India (Moral and Material Progress and Condition)—Paper.
242. Bills—Births, Deaths, and Marriages (Ireland) (as amended by the Select Committee).
237. „ —Grand Juries (Ireland).
239. „ —Dublin Revising Barristers.
240. „ —Lunatic Asylums (Ireland) Act Continuance.
241. „ —County Cess (Ireland) Act Continuance.
243. „ —Parochial and Burgh Schools (Scotland) (No. 2) (amended).
244. „ —Pensions, British Forces (India).
245. „ —Public Works and Harbours.
246. „ —Lord Clerk Register Salary Abolition (Scotland).
247. „ —Enlistment in India.

Delivered on 16th July, 1861.

412. Supply Votes Cancelled—Return.
248. Bills—Courts of Justice Building Act (Money) (as amended by the Select Committee).
238. „ —Prosecutions Expenses.

Southern Italy—Papers.

Delivered on 17th July, 1861.

379. Canada Grand Trunk Railway—Return.
409. East India (Covenanted Civil Service)—Return.
414. Naval Medical Supplemental Fund Society Bill—Minutes of Evidence.
235. Bills—Rails (Highways and Streets).
249. „ —Metropolitan Gas Act Amendment.
250. „ —Ordnance Survey Continuance.

Delivered on 18th July, 1861.

424. Markets (Ireland) Bill—Report from Committee.
430. Post Office (Canadian Mails)—Return.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, July 26th, 1861.*]

Dated 21st March, 1861.

710. W. Andrews, Woburn-chambers, Henrietta-street, Strand—Imp. in insulators for telegraph wires.

Dated 13th April, 1861.

918. J. Wright, 42, Bridge-street, Blackfriars—Imp. in the mode of manufacturing and designing postage letter paper, postage envelopes for letters, and postage wrappers or covers for newspapers and other printed matter. (A com.)

Dated 17th June, 1861.

1544. S. R. Smith, Dover—A new or improved steam boiler.

Dated 18th June, 1861.

1560. W. Fleming, Edinburgh—Imp. in machinery or apparatus for manufacturing snuff.
1562. A. W. Gibson, Belfast—Imp. in mills for the manufacture of barley and rice.

Dated 19th June, 1861.

1572. J. Louch, 69, Fenchurch-street—Imp. in furnaces, boilers, and condensers of steam engines, part of such imps. being applicable to other purposes.

Dated 26th June, 1861.

1640. J. Cowan, Barnes, Surrey—Imp. in apparatus for reburning animal charcoal.

Dated 3rd July, 1861.

1685. R. Richardson, 26, Great George-street, Westminster—An improved railway chair for railways.
1687. J. Woollatt, Preston—Imp. in looms.
1689. J. Bennie and W. Moffat, Johnstone, Renfrew, N.B.—Imp. in the manufacture of heels, clog-irons, horse-shoes, chain links, and similar articles, and in apparatus therefor.
1691. C. Gilfoy, Southampton—Improved means of resisting and extinguishing fire in buildings or on board ship
1695. P. Spence, Newton-heath, near Manchester—Imp. in economizing the manufacture of sulphuric acid, and in obtaining copper from ores used in such manufacture.

Dated 4th July, 1861.

1697. J. Patterson, Beverley, Yorkshire—Imp. in machinery for applying the power of horses or other animals to drive mills or other machines.
1699. R. Mills, Bury, Lancashire—Imp. in washing, wringing, and mangling machines.
1700. M. Gale, Glasgow, and T. Kennedy, Kilmarnock—Imp. in taps or valves.
1701. W. H. Ludford, Staveley, Derbyshire—An imp. or imps. in the manufacture of brooms and scrubbing brushes.
1703. J. Webster, 64A, Gloucester-street, Pimlico—Imp. in compositions used for lubricating railway and other axles.
1704. T. Wilson and J. G. Tatters, Felling, near Gateshead-on-Tyne—Imp. in treating tank refuse or soda waste.
1706. B. G. Sloper, Hackney—An improved method of and machinery for amalgamating and for effecting the separation of gold from earthy and other matters containing the same.

Dated 5th July, 1861.

1707. B. Fowler, jun., Liverpool—An improved sewer and sink trap.
1708. J. Hutson, Richmond—Imp. in cornices, laths, and panels, for bedsteads and other articles of furniture.
1709. G. Williams, Dursley, Gloucestershire—An improved mixture or liquid for extinguishing fire, applicable also for preparing or saturating various kinds of materials and fabrics for the purpose of rendering the same non-inflammable.
1711. J. E. Melon de Pradou and L. G. Lecocq, 4, South-street, Finsbury—Imp. in apparatus for lighting.
1712. R. Lakin, Ardwick, and J. Wain, Manchester—Imp. in certain machines used in preparing to be spun, and in spinning cotton, wool, and other fibrous substances.
1713. W. England, Wollaston Works, near Stourbridge—An imp. or imps. in the manufacture of bricks.
1714. L. Roughton, Bedford place, Old Kent-road—Improved apparatus for extinguishing fires.

Dated 6th July, 1861.

1715. J. Dean, Derby—Imp. in machinery or apparatus for propelling vessels.
1716. J. R. Black, 23, Sumner-place, Onslow-square, and H. W. Spratt, Walbrook-buildings—Imp. in the manufacture of boxes, cases, tubes, rings, and such like articles and machinery for the same.
1717. R. A. Smith, 20, Devonshire-street, Manchester—Imp. in purifying gas.
1718. T. Wilson, Birmingham—An imp. or imps. in moveable spanners or screw wrenches.
1721. T. Smith, 4, Bolton-place, Upper Church-street, Fulham-road—Imp. in the construction of bells.
1723. J. Ridsdale, 4, Stoke Newington-green—Imp. in inkstands applicable to the stoppers of bottles.
1725. C. Farrow, 18, Great Tower-street—Imp. in apparatus for affixing or applying capsules to the necks of bottles and other vessels.
1726. A. Noble Bristol—Imp. in obtaining products from alkali waste and gas lime refuse.
1727. E. R. Handcock, 23, Norfolk-street, Strand—Imp. in machinery for obtaining and applying motive power.
1728. G. Tutill, 83, City-road—Imp. in treating materials for the manufacture of banners and flags.

Dated 8th July, 1861.

1729. J. Snider, jun., Paris, No. 13, Rue Gaillon—A method of utilizing old or smooth bore cannon by strengthening and rifling them so as to render them efficient to fire elongated or cylindro-conoidal projectiles.
1730. F. Warner, Jewin-street, and T. Clark, Baldwin-street, City-road—Imp. in apparatus for supplying water to water closets.
1731. R. Hornsby, jun., Grantham—Imp. in machinery for washing, wringing, mangling, and churning.

Dated 9th July, 1861.

1733. T. T. Macneill, 23, Cockspur-street—Imp. in the construction of barometers, and in apparatus for registering the indications of the same.
1737. E. A. Penley, Cheltenham—Imp. in the construction of drawing boards.
1738. F. S. Barff, Dublin—A new or improved process for the induration or preservation of stone and other analogous absorbent substances or materials, which process is also applicable to the production of artificial stone.
1739. W. C. Parkinson, Cottage lane, City-road—An improved frictionless bearing for gas meters.
1740. J. Keats and G. E. Keats, Leek, Staffordshire—Imp. in sewing machinery.
1741. C. Cochrane, Middlesborough-on-Tees—Imp. in treating gas in its passage from blast furnaces to the furnaces, stoves, boilers, or other heating apparatus where the gas is employed.
1742. R. Hornsby, jun., Grantham—Imp. in thrashing machines.
1743. J. German, 32, Friar-gate, and G. N. Browne, Keddleston-road, Derby—Imp. in apparatus to be used in shampooing.

Dated 10th July, 1861.

1744. R. T. Chellingworth, 12, Buckingham-street, Adelphi, and J. Thurlow, 37, Belvidere-road, Lambeth—Imp. in traction engines.

Dated 11th July, 1861.

1746. G. Weston and J. Weston, Sheffield—Imp. in rotary steam engines and pumps.
1750. J. Farron, Ashton-under-Lyne—Imp. in apparatus and fittings connected with steam engines and boilers.
1752. T. Reeves, jun., Bratton Westbury, Wiltshire—Imp. in apparatus for applying salt or other material to the roots of weeds.
1754. T. G. Messenger, High-street, Loughborough—Imp. in the construction of valves.

Dated 12th July, 1861.

1758. J. Adams, King William-street—Imp. in revolving fire-arms, and in cartridges for the same.

Dated 13th July, 1861.

1762. C. Maschwitz, Birmingham—Imp. in taps or stop-cocks for liquids, steam, and gas. (A com.)
1764. J. Pickering, Clitheroe, H. Pickering, Burnley, and N. Pickering, Wingates, Westhoughton, Lancashire—Imp. in self-acting mules for spinning cotton and other fibrous materials.

Patents Sealed.

[*From Gazette, July 26th*, 1861.]

July 26th.

230. W. Winstanley, J. Kelly, W. Payne, & J. Formby.
233. W. F. Fleming.
234. J. W. Friend.
343. S. T. Crook.
245. W. Archer.
246. Ephraim Smith.
247. J. Poole.
258. J. Robertson.
266. R. Kuntsmann.
270. W. Hart.
278. E. T. Hughes.
625. A. J. Joyce.
763. W. Spence.
1385. H. Allman.

[*From Gazette, July 30th*, 1861.]

July 30th.

257. R. D. Clegg.
263. J. Chatterton.
269. A. Crichton.
275. H. Bessemer.
279. W. Prangley.
280. J. Cameron.
285. W. N. Wilson and W. T. Rowlett.
288. D. Walmsley & J. Rostron.
298. W. Paton.
301. J. Leeming.
303. E. T. Hughes.
338. M. A. F. Mennons.
339. M. A. F. Mennons.
349. G. G. Aggio.
437. J. H. Johnson.
565. W. E. Newton.
707. M. A. F. Mennons.
735. J. H. Johnson.
854. J. H. Johnson.
897. W. E. Newton.
993. E. D. Bourne and P. Davis.
1005. J. D. Samuda.
1800. J. R. Chesneau.
1310. R. Mushet.
1370. M. Burke.
1393. M. A. F. Mennons.
1461. J. Howard and E. T. Bousfield.
1483. R. Romaine.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, July 22nd*, 1861.]

July 22nd.

1652. B. Blake.
1662. H. Barber.
1679. J. Taylor and J. Nimmo.

July 24th.

1946. W. E. Newton.
1979. W. Rose.
1980. A. V. Newton.

[*From Gazette, July 30th*, 1861.]

July 25th.

1684. H. Jackson.

July 26th.

1694. C. N. Kottula.
1711. J. Musgrave.

July 27th.

1696. G. Hurn.
1698. A. Pougault.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, July 30th*, 1861.]

July 25th.

1627. F. Preston.
1661. A. Law.

July 26th.

1750. W. H. Clabburn.

Journal of the Society of Arts.

FRIDAY, AUGUST 9, 1861.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £425,700, have been attached to the Deed.

The following additional arrangements have been made in Foreign Countries to represent the interests of intending Exhibitors :—

Duchy of Brunswick.

The Director of the Society of Trades has been appointed Commissioner.

GUARANTEE FUND FOR THE EXHIBITION OF 1862.

The following additions have been made since the announcement in the *Journal* for July 19 :—

*** *The names marked with an asterisk are those of Members of the Society of Arts.*

NAMES.	AMOUNT.	REPRESENTING THE OBJECTS OF THE SOCIETY—ARTS, MANUFACTURES, AND COMMERCE.
*H. L. Cohen, 2, Cleveland-terrace, Hyde-park, W.	£100	Arts.
*James Tulloch, F.R.S., 16, Montague-place, W.C.	100	Arts.
*John Millar, Bethnall-house, Bethnall-green, N.E.	100	Arts.

By Order,

P. LE NEVE FOSTER, *Secretary.*

NOTICES TO INSTITUTIONS.

The Secretaries of those Institutions whose Members intend to join (with their friends) in the Excursion to the Crystal Palace, on the 27th inst., are requested to communicate with the Secretary of the Society of Arts without delay, stating the number of persons likely to be present.

The Council have communicated with every Railway Company whose line is likely to be traversed by the Excursionists from the Institutions, and have requested that such facilities may be afforded as will allow large numbers to take a part in the proposed gathering.

The arrangements for the supply of books, which had been temporarily suspended, are now renewed on the same terms as before, namely, a discount of 27½ per cent. allowed off books, and 25 per cent. off periodicals, except where such periodicals are irregular in price, such as the Quarterlies, in which case trade price only will be charged.

Forms for ordering books may be obtained on application to the Secretary of the Society of Arts, to whom all orders should be sent.

THE BRITISH COLONIES AND THE INTERNATIONAL EXHIBITION OF 1862.

By P. L. Simmonds.

The colonial collection of products at the International Exhibition next year promises to be one of the most important and interesting features both to Englishmen and to foreigners. In 1851, the colonies were, as a whole, almost unrepresented. The notice given was too short; the undertaking was hurried; the project was quite new, and not thoroughly understood; and, moreover, most of the colonies were scarcely in a position to go to much expense for contributions. The East India Company, however, made a noble display, and some few of the British Colonies a respectable appearance in 1851, and also at Paris in 1855, as I shall have occasion to notice.

According to the latest official returns, the aggregate population of the Colonies and Possessions under British rule exceeds 195,000,000, of which the great bulk, 185,000,000, are distributed over British India. In these colonies a total revenue is raised of about £44,000,000, and the yearly value of the external trade, imports and exports, is upwards of £176,000,000. The cost to the mother country of the colonies, omitting India, is only about £4,000,000, whilst the value of British produce and manufactures shipped to them exceeds £46,000,000, or nearly one-third of the amount of our total exports.

It appears, from the official reports, that out of 23,575 superficial feet of horizontal net space allotted to the British Colonies in 1851, but 6,180 feet was occupied. The only colonies then specially represented were—Canada, which made a good display; a few objects indirectly sent for exhibition from Nova Scotia, New Brunswick, Newfoundland, and Bermuda.—From the West Indies was

a small collection from the Bahamas, and a few odds and ends from Antigua and Barbados. Trinidad and British Guiana were well represented. Of the African Colonies, the Cape was the only one that sent a collection—a few objects illustrating the products of St. Helena, and the West Coast of Africa, were shown by London merchants and individual exhibitors in England.

Of the Eastern Colonies the Mauritius sent but little, but a fair collection was transmitted from Ceylon.

In 1851 the Australasian Colonies were but poorly represented, although a few made some efforts to put in an appearance. The New South Wales and Tasmanian collections were creditable, and a few things were sent from South Australia and New Zealand. With the exception of a small collection from Malta, this formed the aggregate of the Colonial efforts.

At the Paris Exhibition in 1855, the few colonies that did send articles made a very satisfactory display. Canada, especially, obtained honour for its varied collections, which occupied upwards of 3,000 feet of space, contributed by about 350 exhibitors. Jamaica covered an area of about 500 feet, and British Guiana 350, whilst Barbados and the Bahamas were the only other West Indian Colonies that sent. Ceylon occupied nearly as much space as Demerara, and the Mauritius sent a small collection. The Australian Colonies on that occasion were very well represented, although one or two did not show; 251 exhibitors from New South Wales occupied 871 square feet; 118 exhibitors from Tasmania 429 feet; 36 from Victoria 289 feet, and 10 from Newfoundland 117 feet. The official returns show that the twelve British Colonies which exhibited products at Paris in 1853, filled about 500 feet more space than all the colonies which were represented in 1851.

The contributions from the Colonial possessions and many of the miscellaneous and outlying countries which have no special government, or where no commission can be formed, will be under the entire superintendence of Dr. Lindley, F.R.S., who, besides his well-known scientific attainments, brings to the work the great business knowledge and experience gained in the same department at the Exhibition of 1851.

Our Indian possessions and the Straits Settlements will come under the jurisdiction of Dr. J. Forbes Watson, the reporter on Indian products, who has devoted so much attention to a due development of the staples of India, and has lately been so closely occupied in re-arranging the valuable East India Museum at Fyfe-house, Scotland-yard.

1. Africa and the African Colonies.

To no part of the world has greater attention been given of late years than to Africa. In 1851 the products of his great continent were scarcely represented at all. I propose, first, to speak of our own colonies in Africa, and then pass on to notice the trade and products of other parts.

The South African territory is divided into five large provinces — the Cape Colony, British Kaffraria, the Orange Free State, the Transvaal, or South African Republic, and Natal. The Cape Colony has been a British possession since 1806. Kaffraria was declared a British dependency at the close of the last Kaffir war; it is now a separate colony, under the administration of Colonel Maclear, as Lieut.-Governor. The Orange River Free State and the Transvaal Republic are occupied by a sparse population of Dutch settlers. The British sovereignty over the Orange State has been withdrawn, to the regret of many of the settlers. Natal, the most prosperous of the young colonies springing up in South Africa, has been under British protection since 1845.

Although the Cape colonists have suffered much from time to time by Kaffir invasions, the horse sickness, and the lung disease, or pleuromania, and occasional droughts, yet the increase of live stock has been very considerable. The natural grasses, without cultivation of any kind, support from twelve to fourteen millions of sheep and goats and half a million of horned cattle. There are also a large number of horses raised, the Cape being one of the chief sources of supply for mounting the Indian army. The exports of wool have, within the last few years enormously increased; and, considering the vast tracts of unoccupied country suitable for sheep farms, this pursuit offers an unlimited field for enterprise. It has been proved by extended experience that a flock of sheep, on a suitable farm, will, after deducting all the management, pay the capitalist thirty per cent., with an annual increase of capital besides.

The Cape Colony has been advancing in sheep-farming—the most important of all productive pursuits—faster than any other colony. In 1851 the export of wool from the Cape was under 6,000,000lbs.; last year, including Natal and the Dutch States, the production was as much as 24,000,000lbs. But agriculture is also now well attended to. Whilst large quantities of American flour were formerly imported, more than sufficient wheat is now grown to supply local wants. There is a considerable surplus exported. In 1852 the export of Cape wines only amounted to 250,256 gallons; in 1859, 786,620 gallons were imported into the United Kingdom. While the revenue of the Colony has doubled in the last ten years, the value of the colonial exports has trebled.

The following are the official steps that have already been taken in the Cape Colony for promoting the objects of the Exhibition. On the 26th November, 1860, the annexed notice was published in the Government *Gazette*:—

"His Excellency the Governor is desirous that the products of the Cape of Good Hope should be properly exhibited at the ensuing International Exhibition, to be held in London in 1862, feeling convinced that great benefits will result from a knowledge of the natural resources of the colony being extensively disseminated. His Excellency has therefore appointed the undernamed gentlemen to form a Commission to deliberate upon the best means of carrying out this design, and trusts that they will meet with the support and co-operation of all classes of her Majesty's subjects in South Africa. Hon. R. Southey, Acting Colonial Secretary; Hon. W. S. Field, Acting Collector of Customs; Hon. W. Porter, Attorney-General; Sir Thomas Maclear, Astronomer Royal; L. Pappe, M.D., Colonial Botanist; Sir W. Hodges, Knt.; the Committee of the Cape Agricultural Society, ten delegates of the western districts, and some other gentlemen. The names of Messrs. Layard and Fairbridge, were subsequently added to the Commission.

In order to divide the labour, another notice in the *Gazette* states that the Governor has appointed the undermentioned gentlemen to be members of a Commission in the Eastern Province for carrying out the objects of the Great International Exhibition of 1862:—Museum Sub-Committee—Lord Bishop of Graham's Town; Dr. Atherstone; W. Edwards, Esq.; J. Standen, Esq.; H. C. Haswell, Esq.; B. J. Glanville, Esq.; — Matthews, Esq. Sub-Committee from Albany Agricultural Society—Sir Walter Currie; Geo. Wood, jun., Esq.; H. Blaine, Esq.; C. H. Caldecott, Esq.; G. C. Frames, Esq.; D. Hannay, Esq.; T. C. White, Esq.; A. C. Bisset, Esq.; J. Baines, Esq.; T. F. King, Esq.; W. R. Thompson, Esq.

A little jealousy and ill-feeling just now exists between the two divisions of the colony. The commercial progress of the eastern province has been much more rapid than that of the western, and there has been a strong agitation for separation and the establishment of an independent colony. This, however, is not likely to interfere with the due collection and display of products; indeed, a competitive rivalry is more likely to arise.

Dr. Pappe, the colonial botanist, who has already, by his scientific works, done so much towards making known the resources of the Colony, has been on a tour through the two provinces, collecting samples of the colonial woods. He also visited British Kaffraria, passing through, on his way, the well-wooded districts of the Kalbergs and the Amatotas. Dr. Pappe has already secured a large number of valuable specimens, which he has had prepared for the purposes of scientific as well as economic

exhibition. It is his intention to write a descriptive catalogue of these specimens, which will be forwarded with the collection to England. Dr. Pappe is of opinion that some of the colonial timber is remarkably suitable, on account of its durability, for railway sleepers; and ridicules the idea of looking to foreign sources for a supply of inferior and yet more costly material.

On the arrival of Dr. Pappe at Graham's Town, on the 22nd of April, a special meeting of the Commission was held for the purpose of conferring with him on matters concerning the Exhibition. A letter was read from the Colonial Secretary, dated the 25th March, requesting to be informed whether the Eastern Commission would agree to allow their contributions to be sent to Cape Town, there to be selected from before they were transmitted to England; and also expressing the desire of the Governor that all contributions should be sent together from Cape Town. It was resolved that no objection be made to send whatever specimens of produce can be collected in the Eastern Province to Cape Town for transmission to England, together with the collection of the Western Commission, or generally to act in concert with the Western Commission, but that no selection would be permitted to be made from the collection sent by the Eastern Commission. A letter was read, dated 5th April, from the Colonial Secretary to the Lord Bishop of Graham's Town, stating that if the Eastern Commission agreed to act with the Western, the extension of their Commission, as desired, would be made. Dr. Pappe suggested that the depôt for the reception of the products to be transmitted to the Exhibition should be decided on as soon as possible.

At a recent meeting of the committee of the Albany Agricultural Society, it was resolved to call for offers of produce for the Exhibition, and to give £50, in two prizes of £30 and £20, for the best samples of washed wool, the quantity for either prize to be not less than 1,000 lbs. The chairman stated that Mr. Pohl's wool, which obtained the first prize at their last Agricultural show, had sold for 2s. 6d. a pound, notwithstanding that at the time it was sold prices were on the decline. The export of South African wool now reaches about 24,000,000 lbs. annually. Great complaints are, however, made by the brokers here of the dirty and burry condition and short staple of much that comes to hand. The sheep farmers are too anxious to realize, hence we find the opinion expressed among them, "That wool of eight months' growth is quite equal to that of twelve months, and that to shear twice in two years would be better for the sheep, better for the sellers, and better for the buyer."

The Albany Agricultural Society also proposes to give a prize of £5 for the best sample of cotton grown on the frontier, and £50 for the best bale to be sent to the Exhibition of 1862, to which would be added the silver medal offered by the Cotton Supply Association of Manchester.

His Excellency, the Lieut.-Governor of Natal, in a dispatch to the Secretary of the Colonies, dated May 2, announces that he had appointed committees in each county and a central committee at the seat of Government, Pietermaritzburg, for the purpose of collecting articles suited for the Exhibition, and that he has every reason to believe that a good collection of the natural products of the Colony, and of such other articles as form the exports from Natal, will be obtained. James Mann, Esq., M.D., has been appointed Hon. Secretary of the Committee at the seat of Government.

The status of Natal is very different to what it was ten years ago. The colony has increased greatly in trade and productive resources. Sugar has become an important staple; coffee has been largely cultivated; arrow-root is now an article of export; ginger has been raised; ground nuts grown; cereal crops are well attended to; oranges, pine-apples, and other tropical fruits are cultivated in perection. It would be to the interest of the colonists to send specimens of everything that is produced, because these would prove not only interesting to the merchant, but attractive and useful to intending emigrants to that quarter. Steam communication to the West Coast, to the Cape, and to Natal, is now so regular and well maintained, that Africa is brought within nearer relation to England, and it is now being proposed to extend the steam mail line from Port Natal to Mauritius.

At Sierra Leone, Governor Hill, in a despatch to the Duke of Newcastle, dated 16th April, states that he has issued the following notice calling the attention of the colonists to the importance of the Exhibition:—

"Government Notice.

"The promoters and proposed Trustees of the Exhibition of Works of Industry and Art of all Nations, to be holden in London in the year 1862, having notified their intention of opening the Exhibition on Thursday, the 1st of May of that year, His Excellency the Governor-in-Chief has much pleasure in calling the attention of the inhabitants of the Colony to the subject, and inviting them to become contributors to the undertaking.

"The general conditions of the Exhibition, and the terms on which exhibitors will be invited to take part in it, will be shortly published. The Exhibition in its leading features will closely resemble that of 1851, pictures, however, being added on this occasion, and such preparations as can be made, in anticipation of more detailed information, may proceed on this understanding.

"As the demand for space, however, will in all probability be very much in excess of what it will be possible to provide, so that quality and not quantity will have mainly to be looked to in deciding upon the articles to be admitted, the Trustees hope that the greatest care will be exercised in selecting good specimens of the Industry and Art of this Colony, and more especially of its natural productions.

"By His Excellency's command,
(Signed) "GEO. W. NICOLL,
"Colonial Secretary.

"Secretary's Office, Sierra Leone, 14th March, 1861."

H.M. Commissioners have not yet received advices as to what steps have been taken at Gambia and the Gold Coast.

With respect to other parts of Africa, the trade of the West Coast generally is likely next year to be well represented by individual exhibitors, especially the leading African merchants of London, who have sent out instructions to make collections of products of all kinds. The African Steam Navigation Company has instructed its agents at its various depôts to attend specially to this matter. The African Aid Society, a newly established Society, of which Lord Alfred S. Churchill, M.P., is chairman, has applied for space for specimens of produce, manufactures, and implements, which it has been promised, and which it intends making, subsequently, the nucleus of an African museum. The various Missionary Societies have instructed their missionaries to aid in the collection of such objects for exhibition. The Foreign Office has instructed its consuls and consular agents to render their assistance in procuring good examples of every description of raw produce yielded by the regions with which they are in communication, with the view to their being displayed at the forthcoming International Exhibition.

Dr. Baikie, R.N., employed in the Niger Expedition, will doubtless bring his scientific knowledge to bear in sending home, as he has already done, useful products; while Dr. Livingstone, from his official position and knowledge, will also be able to aid the Exhibition.

The Free Republic of Liberia intends to make a creditable display of products, and Mr. Gerald Ralston, the Consul-General here, and Mr. J. H. Gurney, M.P., will be the London Commissioners.

One of the last Liberian papers named states:—

"We are happy to announce that the Government of Liberia will procure a suitable place in that exhibition where our products can be fairly represented.

"The government will purchase for cash, from producers, cotton, sugar, syrup and molasses, coffee, palm oil, groundpeas, and pea-nut oil, arrow-root, cassada starch, ginger, cayenne pepper, well dried in the sun, and of a reddish colour, and such other of Liberian products as may suit the purpose. These articles must be the best that can be produced here, for it must be borne in mind that we have to compete with old and great nations of established reputation. At the desire of the producers, the different products will be labelled with the name of the producers. The articles, having been purchased, will be from that time, the property of government.

"We are almost 'overjoyed' at this prospect of establishing a fair reputation for Liberia; we are so full, that we are entirely unable to express ourselves upon this important subject. Will Liberians avail themselves of this opportunity? By one great effort they can now place themselves far ahead of their present position.

"In our exultation we forgot to say that persons producing articles for this purpose, must deliver them to the government by December, as many necessary arrangements must be made before they can be shipped."

Mr. Ralston, writing on the position of this Republic, says:—

"I am happy to add that the progress of Liberia, in an industrial point of view, is as favourable as can be expected in a country where capital is the great requisite of the community. In certain districts, however, particularly on the banks of the St. Paul's river (back of Monrovia), the cultivation and manufacture of free-labour sugar is much extended and constantly increasing; and sugar-mills are gone and going out from the United States, and from England, to aid this valuable industry. In Bassa county the cultivation of free-labour coffee has succeeded in sending out the best quality of this important article of commerce. The production of palm-oil is extending all over the Republic. The collection of camwood (a most excellent dye-wood, well known in Manchester), of ivory, gold-dust, and other important exports is greatly increasing, and I may say that nothing is wanting but more skilled labourers and enterprising settlers, with moderate amounts of moneyed capital, such as my fellow countrymen, the free people of colour of the United States could conveniently, and most advantageously to themselves, furnish, to give vast extension to their exports. Finally, the production of free-labour cotton is more and more attended to. This useful fibre grows spontaneously all over the country, and the labour of collecting, cleaning, and preparing it for market is alone requisite. In short, the industrial future of Liberia is most promising, and will, I hope, attract the attention of the free coloured people of Virginia, Maryland, Pennsylvania, Ohio, etc., who, living under such unfavourable and depressing circumstances in their native land, would so much benefit themselves, and so much benefit Liberia, by going to the west coast of Africa, to build up a respectable nation of coloured people."

The extension of French colonization in Algeria, and the progress of settlement northwards from the Cape Colony, have done much to show the agricultural and pastoral capabilities of North and South Africa. The extension of legitimate commerce on the coasts has also materially assisted in the suppression of the slave trade, while the progress of discovery in the interior, by such men as Richardson, Barth, Vogel, Livingstone, Petherick, Anderson, Baikie, Burton, Speke, Du Chaillu, and others, has made us better acquainted with many of the races and countries there.

The recent efforts of the Cotton Supply Association of Manchester to stimulate the production of cotton in Africa, almost every part of which is suited to the growth of the plant, have produced beneficial results. Agriculture and commerce are rapidly advancing in Egypt, while the French are making great exertions to develop the capabilities of Algeria and Senegal. The magnificent collection of indigenous African produce shown in the permanent exposition of Algeria and the other French colonies at Paris, affords a striking evidence of the extent of the openings for commerce in that vast and fertile continent.

Only those who have carefully examined the yearly statistics have any conception of the present amount and growing extent of the British trade with Africa, to say nothing of that carried on by the Americans, French, and other nations. The value of the exports of British produce and manufactures to our own Possessions on the west coast of Africa has advanced from £263,725, in 1858, to £340,311, in 1860; and the aggregate value of the British export trade to all parts of Africa last year was as follows:

	£
To British Possessions.	
Cape Colony	1,827,093
Natal	236,933
Ascension	8,685
St. Helena	46,312
West Coast	340,311
To Foreign Countries	
Egypt	2,479,719
Tunis	3,580
Algeria	43,754
Morocco	171,209
West Coast	966,981
East Coast	2,812
African Ports on the Red Sea	903
	£6,128,292

Of course, when we view this in relation with so large and populous a continent, rich in varieties of all kinds of valuable products, this is still but trifling, and shows the necessity of increased stimulus from Great Britain. The progress in some branches of the African trade, during the last few years, has been considerable: of palm-oil, for instance, 450,836 cwts. was the annual average of shipments to England in the ten years ending 1850; while in the ten years ending 1859 it rose to 715,280 cwts.; and in the year 1860 to 804,326 cwts. There are also considerable shipments made direct from Africa to America and France. Groundnuts, for oil, are also extensively grown: from the River Gambia alone, where the cultivation of them began in 1849, 12,000 tons of these nuts were shipped last year, chiefly to Marseilles. Sources of supply of other oleaginous products are also opening—as the shea butter from the *Bassia Parkii;* mote-nut grease, from the *Carapa Guineensis*, and from the seeds of other euphorbiaceous plants. Ivory, to the extent of about 3,000 cwts. a-year; the so-called African teak, ebony, bar and camwoods; India-rubber, gums, and resins (copal and arabic), ostrich feathers, wool, gold dust, and various other products always in demand, prove that there are abundant elements for profitable trade with the people on the coast and in the interior, and that Africa is worthy of more attention than it has hitherto received.

The Exhibition of 1862 offers a great opportunity of bringing speedily and effectually under the notice of mercantile men the little known native riches of this part of the world; its oils, its timber, its spices, its textile materials, and those other varied raw productions which European skill knows how to apply.

NOVA SCOTIA AND THE INTERNATIONAL EXHIBITION OF 1862.

The *Halifax Chronicle* says:—"Last night's *Gazette* contains the appointment of Commissioners for Nova Scotia in connection with the great International Exhibition of Works of Industry and Art, to be held in London in May, 1862. We presume that these Commissioners are intended to form a sort of central committee for the province, and that they will endeavour to form subordinate committees in the several counties, by whose assistance they may be able to excite a proper degree of interest in the great work to forward which they have

been appointed. The example of Canada and New Brunswick should stimulate them to extraordinary exertions. In the former province, preparations for the Exhibition have been in progress for six months, and the Government Commissioners are leaving nothing undone to secure such a display of the products of Canadian industry, and the natural resources of their country, as will place her in the most favourable light before the world. In New Brunswick also the people seem fully alive to the importance of the occasion. Among the means adopted in that province to forward the work, a grand Provincial Industrial Exhibition is to be held at Sussex Vale in November next, at which the best articles produced, in agricultural produce or manufactures, are to be secured for exhibition in London. It is too late now to think of anything of this kind for Nova Scotia; but if the time still available be used to advantage, much can be done without the aid of a Provincial Exhibition. There is still ample time to make arrangements for a fair representation of the products of our forests, our farms, our fisheries, and our mines. Manufactures, unfortunately, we have none to exhibit; although, perhaps, even in this branch of industry, a steam-engine or a pianoforte might be produced, to show the people of England that Bluenose is not altogether destitute of the arts of either industry or refinement. But the four great fields referred to above should not be neglected. Nova Scotia produces wheat, oats, and barley equal in weight and quality to any in the world; yet of the four branches named, agriculture is that in which she has perhaps least to exhibit. The interests of the province demand that on this occasion she be more fairly represented than in 1851. Let the samples of her products sent for exhibition be accompanied with carefully prepared printed statements, giving accurate and full information of the extent and productivenesss of our arable lands and of our fishing grounds, of the extent and richness of our coal fields, our iron mines, our forests, our gold fields, of the character of our climate, of everything, in short, calculated to give the millions of people who will visit the Exhibition an idea of what kind of country Nova Scotia really is—of how well it is adapted for a home for the emigrant, and how well deserving of the notice of capitalists; and the effect produced in the minds of intelligent Englishmen may be greater, and more beneficial, than the most sanguine Nova Scotian at this moment can dream of."

SANITARY CONDITION OF THE CITY OF LONDON.

The following is the Report of Dr. Letheby, Medical Officer of Health, presented to the Commissioners of Sewers, and dated June 22nd, 1861:—

Foremost of the statistical facts which have been brought to light during the quarter, are those which relate to the resident population of the City. At the beginning of the present century (in 1801) there were 128,833 persons living within the City boundaries. In the four succeeding decades, the number fluctuated between 121,124 and 125,065, and in 1851 it rose to 129,171. This is the largest population the City has ever contained, and perhaps it is the densest population on record; it is in the proportion of nine persons to every house, and 180 persons to every acre. At the present time, however, according to the Census which has just been taken, the number has fallen to 113,367; and this is the smallest enumeration of the present century. It shows a falling off of rather more that 12 per cent. on the Census of 1851, and 9 per cent. on that of 1841. In the three districts of the City the reduction has been from 5·8 per cent. to 18.5; in the Eastern Union, for example, it is 5·8, in the Western, 8·4, and in the Centre, or City proper, 18·5. Large, however, as these reductions are, they have not yet brought the density of the City population to that of the rest of London, for still there are 8·4 persons to a house, and 156 to an acre; whereas, in the rest of London there are but seven persons to a house, and only 35 to an acre.

The principal cause of the decrease of the City population has been the expansion of commerce and the rapid progress of industry. Trade has outgrown its old proportions, and has become too busy for its ancient habits. Houses that were once the dwellings of the merchant, as well as the modest marts of commerce, have grown up to be the giant palaces of industry, and the neighbouring tenements of the artizan have been swept away to make room for the bustling energies of trade. In this manner about a thousand houses have been lost to the City proper since 1581, and more than twelve hundred to the whole City. But while this destruction has been going on in the habitations of the people, there has not been a reduction in the number of the population. Twenty years ago there were but 124,717 persons in the City, living in 15,727 houses. At the present time there are 113,367 persons living in 13,478 houses. So that, while the population has diminished to an extent of only 9 per cent., the houses have been demolished to the extent of 15 per cent. This is a forcing of another person into every house; and the over-crowding is most felt in those districts where the advances of commerce have not yet created a demand for public improvements. There the dwellings remain as before—at least, there is no increase in their size or accommodation—notwithstanding that the number of occupants has become 10 per cent. more. In the Eastern and Western Unions, for example, there are now from nine to ten persons in a house, and there are from 200 to 300 persons upon an acre. Nowhere else in any town of England, or city of Europe, is there so dense a population. So that, independently of the crowds which throng the City during the day, and leave it at night, there is still a resident population which is enormously overcrowded; and these must have their sanitary wants provided for. A glance at the character of the population, especially of that part of it which abides in the courts and alleys of this city, will at once discover the magnitude of those wants, and show how difficult it is for the sanitarian to master disease, and check the progress of death. No wonder that the mortality of such places is so largely above the average.

In the course of the quarter which has just expired, there were 827 births and 694 deaths in the City. Both of these numbers are below the averages for the corresponding period of the last ten years; and the reduction has been to the extent of 3 per cent. in the case of the births, and 6 per cent. in that of the deaths.

The distribution of the births have been at the annual rate of 35·7 per 1,000 of the population in the Eastern Union, 28·6 in the Western, and 23·7 in the Central—making a total of 29·3 for the whole of the City. In the rest of London, during the Spring quarter, the birth-rate is 32 per 1,000 of the inhabitants, and in all England it is 35·6. It is only in the poorer and denser districts of the City, therefore, that the birth-rate reaches to the natural standard.

As for the death-rate, it is high, and shows a remarkable contrast with that of former years. This is mainly due to the new features presented by the recent Census; for, as I have said, instead of a population of nearly 130,000, which has been the basis of former calculations, the number is but 113,367. This brings the total death-rate of the quarter to an annual proportion of 24·5 per 1,000. In the Eastern Union it was 24·9, in the Western 27·1, and in the City proper only 22·4. Undoubtedly this is a high mortality; for in the Spring quarters of the last ten years the mortality in the chief towns of England has been but 23·5 per 1,000, and that of the whole country but 22. It must not be forgotten, however, that the density of the population in the City is 157 per acre, whereas that of the chief towns of England is but 5.

With regard to the ages at death, 40 per cent. of all the deaths were among children of less than five years

of age, and 23 per cent. among old persons at 60 and upwards. The mortality of adults in the prime of life, at from 20 to 40 years of age, was a little more than 13 per cent., and at from 40 to 60 it amounted to rather more than 16 per cent. The number of deaths at from 20 to 50 is below the average and in this respect there has been a marked improvement on former years,

Atmospheric influences have had much to do with the high mortality of the quarter, for nearly one-sixth of all the deaths were caused by pneumonia and bronchitis. Phthisis also has been more than usually fatal—in the proportion of 103 to 86. The other forms of tubercular diseases, however, have not been aggravated by the coldness of the season, for tabes and scrofula have caused but 40 deaths, and hydrocephalus but 27—the average for the last ten years being 43 and 27. Of the zymotic class of diseases, measles and whooping cough have been most prevalent. The former has been fatal in 24 cases, and the latter in 45—the averages for the quarter being 14 and 27. Infantile diarrhœa has likewise been remarkably prevalent, for the number of deaths has increased from 4 to 10. The other forms of zymotic diseases have fallen below the average—continued fever, for example, has declined from 26 to 17, scarlet fever 20 to 11, small-pox from 9 to 1, and the diarrhœa of adults from 5 to 3; so that with the exception of bronchial affections and lung diseases, together with measles and whooping-cough, severe maladies have not been very prevalent, and the state of the public health has been good. This is likewise manifested in the sickness returns for the quarter, especially in the returns of fever attended among the poor by the surgeons of the City Unions; for instead of an average of 125 cases in the quarter, there have been but 29; and it is remarkable that for the last four years there has been a rapid decline in the number of these returns. In the Spring quarter of 1858 there were 280 fever cases attended among the poor by the Union surgeons; in 1859 the number was 108, in 1860 it was 82, and in the quarter which has just expired it was but 29. This is a little less than 1 per cent. of all the sickness, whereas the average for the season is nearly 4½ per cent., and four years ago it was nearly 10 per cent. In fact, in the rest of London the proportion is about 2 per cent., and in some of the chief towns of England it is 2·1 per cent. This improvement in the returns is undoubtedly due to the operation of sanitary measures, and to the suppression of those influences which tend to foster disease among the poor.

The principal facts connected with the meteorology of the quarter, as shown in Table I., have been deduced from observations at Guildhall, under the superintendence of Mr. Haywood. The mean temperature of the season has been about one degree below the average of former years (51·4°), and the thermometer has ranged from 82° to 36°. The daily range, however, has sometimes been as high as 24 degrees. This, conjoined with the humidity of the atmosphere, which has averaged 85 per cent. of saturation, has been the cause of the large increase of lung diseases.

Table I.—Births, Deaths, and Meteorology of each of the Thirteen Weeks of the Spring Quarter of 1861.

1861 Weeks ending on Saturday.	Weekly Number of Births and Deaths. East London Union. Pop. 40,673. Births.	Deaths	West London Union. Pop. 27,144. Births.	Deaths	City of London Union. Pop. 45,550. Births.	Deaths	Entire City. Pop. 113,367. Births.	Deaths	Temperature. Highest.	Lowest.	Mean.	Mean of 43 Years.	Greatest Daily Range.	Barometric Pressure. Highest.	Lowest.	Mean.	Degree of Humidity. Saturation = 100.	Rain Fall. Total in Week.	Number of Wet Days.
									Deg.	Deg.	Deg.	Deg.	Deg.	In.	In.	In.	Deg.	In.	
March 30	28	24	18	15	18	22	64	61	*	41·2	45·2	42·5	*	29·94	29·45	29·66	96	0·37	4
April 6	27	24	15	17	23	22	65	63	*	36 2	43·2	44·4	*	30·17	26·68	29·78	88	0·70	5
„ 13	32	15	20	10	21	21	73	46	65·8	36 9	45·1	45·2	24·1	30·58	30·28	30·36	79	0·00	0
„ 20	36	23	15	11	28	20	79	54	68·1	38·4	44·4	46·1	24·2	30 37	30·18	30·20	89	0·00	0
„ 27	35	25	11	10	17	14	63	49	62·0	36·9	46·7	47·5	17·2	30·13	29·85	29·93	78	0·15	2
May 4	28	21	18	15	24	21	70	57	62·1	36·4	47·6	50·0	14·6	30·32	29·96	30·12	78	0·51	4
„ 11	29	16	11	13	28	25	68	54	53·1	38·4	42·4	51·7	14·7	30·15	29 56	29·77	95	0·65	5
„ 18	21	26	13	10	23	29	57	65	73·4	42·9	52·3	52·2	20·2	30·42	30·11	30·19	93	0·53	3
„ 25	27	23	12	18	19	15	58	56	73·0	42·7	58·5	54·0	23·3	30·42	29·78	30·05	76	0·01	1
June 1	26	10	22	20	21	13	69	43	72·0	51·1	57·0	59·5	18 1	30·09	29·84	29 90	73	0·14	2
„ 8	22	17	16	14	13	18	51	49	60·0	48·5	51·3	57·6	9·3	30·06	29·87	29·91	86	0 91	6
„ 15	29	14	11	14	20	19	60	47	82·0	48·9	59·3	58·3	21·9	30·27	29·79	29·98	90	0·45	3
„ 22	23	16	12	17	15	17	50	50	77·0	51·9	60·9	59·6	22·7	30·12	29·84	29 90	90	0·60	2
Mean	28	19	15	14	21	20	64	54	68·0	42·3	50·3	51·4	19·1	30·23	29·86	29·98	85	0.45	3

The Meteorology of the Quarter is from observations made at Guildhall, under the superintendence of the Engineer, Mr. Haywood; and the Mean Temperature of 43 years is from the weekly returns of Mr. Glaisher, at the Royal Observatory, Greenwich.

* The thermometers being under repair, observations were not taken.

In the Spring quarters of 1858 and 1859, when the river was so offensive, the average humidity of the air was only 68 and 69, and the mean temperature was 57·6° and 59·8°. During those quarters the warmth of the river and the evaporation from its surface were considerable; indeed, in the month of June of 1858 the temperature of the water was 72·4°, and in the corresponding month of 1859 it was 67.2°. In the succeeding months it rapidly rose to the temperature of 75°, and then the putrefaction of the water was at its highest; but during the quarter which has just expired, as well as that of 1860, the temperature of the river has not exceeded 62°, and there have been but slight signs of putrefaction. The conditions, therefore, which seem to be necessary for a high state of decomposition in the river are, a continued absence of rain, a hot spring, and a dry condition of the atmosphere. The temperature of the water must be over 60°, the rainfall less than two inches in the month, and the humidity of the air below 80. With these conditions there is not only a diminished supply of fresh water from the upper tributaries of the river, but the volume of the stream is still further diminished by rapid evaporation from its surface. Under these circumstances, the daily supply of sewage becomes concentrated, the downflow of the current arrested, and oceanic water rises in the bed of the river to maintain its tidal level. Then it is that the mixture of sewage and sea-water putrefies and becomes a nuisance. This state of things may be predicated not only by the temperature and dryness of the air, but also by the chemical composition of the water; for when the proportion of saline matter, at high tide at London-bridge amounts to more than 60 grains per gallon, there is imminent danger of the river becoming offensive. This is the result of almost weekly observations

made over a period of four years; and, as those observations are likely to be of use in future inquiries into the state of the river, I have classified them in Tables II., III., IV., and V. As far as I know, there have not been any similar consecutive examinations made, and therefore they may be of service when the question arises as to the influence of the new system of drainage on the state of the river. Last year, and up to the present month of this year, the river has been in a normal condition; for its composition has not been very different from that recorded in the early analyses of Dr. Lambe and Dr. Bostock. In the course of the whole year, the proportion of the saline matter dissolved in the river water at high tide at London-bridge has amounted to only 28·9 grains per gallon, and the organic matter to 3·3 grains. The range has been from 19·6 to 57·3, and the organic matter from 2·6 to 5·5. The chief constituents of the saline matter have been as follows:—Carbonate of lime, 12 grains; sulphate of lime, 4·5 grains; common salt, 10 grains; alkaline nitrates, about 2 grains; and ammonia in combination, 1·3 grains. The quantity of suspended matter in the water has averaged only 6·4 grains to the gallon. At times it has risen to from 12 to 15 grains, but this has happened during high winds, as at the time of the equinoxes, when the surface of the water has been ruffled, and the mud upon the shore disturbed. The principal constituent of the suspended matter is ferruginous clay, and with this there is combined about one-fifth of its weight of organic impurity. It is remarkable that the river water near the shore is always a little less impure than that at mid-stream. This arises from the influx of fresh water, and perhaps also from the purifying influence of the atmosphere on the thinner stratum of liquid, as well as from the circumstance that the main current of the rising tide is in the middle of the stream.

In the course of the quarter I have examined the water supplied to the City by the New River Company, and I have also analyzed the water furnished by twenty-two of the City pumps. The first-mentioned supply has not been objectionable; for the quantity of saline matter dissolved in the water has amounted to only 17·4 grains per gallon, and the organic matter to less than 2 grains (1·9). The chief constituents have been as follows:—carbonate of lime, 12·6 grains per gallon; sulphate of lime, 1·9; alkaline sulphate, 0·2; alkaline chloride, 1·2; alkaline

Table II.—Mean Composition of Thames Water at High Tide at London Bridge, and at Mid-stream during each of the Months of 1860.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Aver. of year.
Appearance on standing ...	Clear.	Clear.	Clear.	Slightly Turbid.	Slightly Turbid.	Slightly Turbid.	Slightly Turbid.	Slightly Turbid.	Slightly Turbid.	Clear.	Clear.	Clear.	Clear.
Odour of the Water	None.	None.	None.	Faint	Faint.	Faint.	Faint.	None.	None.	None.	None.	None.	None.
Colour of Deposit	Brown.	Brown.	Brown.	Brown.	Brown.	Brown.	Brown.	Brown.	Brown.	Brown.	Brown.	Brown.	Brown.
Dissolved Constituents...	27·1	24·4	26·0	25 7	32 0	23·8	34·9	53·5	62·8	29·1	26·3	21·9	32·2
Organic	3·0	2·6	2·3	2·8	3·1	4·2	2·8	4·1	5·5	3·6	3·2	2·8	3·3
Mineral	24·1	21·8	22·7	22·9	28 9	19·6	32·1	49·4	57·3	25·5	23·1	19·1	28·9
Suspended Matter	7·9	6·7	15·2	3·2	6·2	6·9	1·8	3·7	4·8	4·0	12·0	4·1	6·4
Organic	2·2	2 0	1·6	0·6	1·3	2·1	0·4	1·0	1·1	1·1	2·8	1·1	1·4
Mineral	5·7	4·7	13·6	2·6	4·9	4·8	1·4	2·7	3·7	2·9	9·2	3·0	5·0
Total per Gallon (grains)...	35·0	31·1	40·1	28·9	38·2	30·7	36·7	57·2	67·6	33·1	38·3	26 0	38·6
Ammonia per gallon	1·0	1·1	1·3	0·9	2·7	1·0	1·8	1·3	1·7	0·9	0·6	0·9	1·3
Combined Sulphuric Acid .	2·3	2·5	2·9	2·4	2·6	2·2	2·7	3·0	4·4	2·1	2·3	2·0	2 6
Alkaline Chlorides......	3·7	3·8	3·7	3·8	7·6	2·7	13·3	28·5	38·1	9·0	4·7	2·7	10·1
Mean Temperature of River	42·2	36·5	42·5	46·4	55·4	57·9	62·6	61·0	58·4	51·7	46·6	41·4	50·2
Highest Temperature (deg.)	48·0	40·5	48·0	48·5	62 0	60·0	64·5	62·5	61·0	55·5	52·0	45·0	64·5
Total Rain-fall (inches) ...	1·6	1·0	1·3	1·1	3·7	4·6	2 7	3·7	2 7	1·1	2·2	1·3	27·0
Number of Wet Days	21·0	13 0	18·0	13·0	14·0	17·0	14·0	26·0	17·6	10·0	12·0	14·0	189·0

Table III.—Mean Composition of Thames Water at High Tide at London Bridge, and at 6 feet from the shore on the City Side, during each Month of 1860.

	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Average of Year.
Appearance on standing	Slightly turbid.	Slightly turbid.	Clear.	Slightly turbid.	Slightly turbid.	Slightly turbid.	Slightly turbid.	Slightly turbid.	Slightly turbid.	Slightly turbid.	Clear.	Clear.	Slightly turbid.
Odour of the Water ...	Faint.	Faint.	None.	Faint.	Faint.	None.	Slight.	Faint.	None.	None.	None.	None.	Faint.
Colour of the Deposit...	Brown.	Brown.	Brown.	Brown.	Brown.	Brown.	Brown.	Brown.	Brown.	Brown.	Brown.	Brown.	Brown.
Dissolved Constituents	26·2	22·8	24·3	26·2	27·1	24·4	30 8	55·8	54·3	26·5	25·2	22·6	30·7
Organic	3·2	2·0	2·1	2·9	2·6	3·4	2·7	4 0	5 1	4·4	2·8	2·9	3·1
Mineral	23·0	20·8	22·2	23·3	24·5	21·0	28·1	51·8	49·2	22·1	22·4	19·7	27·6
Suspended Matter	9·0	5·4	7·7	3·3	5·9	5·9	2·2	3·1	7·2	9·4	9·2	4·8	6·1
Organic	1·7	1·1	1·5	0·8	1·3	1·9	0·5	0·8	1·6	3·3	1·9	1·0	1·4
Mineral	7·3	4·3	6·2	2·5	4·6	4·0	1·7	2·3	5·6	6·1	7·3	3·8	4·7
Total per gallon (grains)	35·2	28·2	32·0	29·5	33·0	30·3	33·0	55·9	61·5	35·9	34·4	27·4	36·8
Ammonia per gall. (gr.)	1·3	1·4	1·3	1·0	2·4	0·9	1·0	1·3	1·5	0·8	0·8	0·8	1·2
Combined Sulphuric Acid (grains)	2·1	2·4	2·7	3·1	2·5	2·1	2·4	3·3	3·9	2·6	2·2	2·0	2·5
Alkaline Chlorides (gr.)	2·9	3·1	3·3	2·7	7·6	2·7	9·3	27·9	33·2	5·7	3·9	2·2	9·0
Mean Temperature of River	42·2	36·5	42·5	46·4	55·4	57·9	62·6	61·0	58·4	51·7	46·6	41·4	50·2
Highest Temperature of River	48·0	40·5	48·0	48·5	62.0	60·0	64·5	62·5	61·0	55·5	52·0	45·0	64·5
Total Rain-fall (inches)	1·6	1·0	1·3	1·1	3·7	4·6	2·7	3·7	2·7	1·1	2·2	1·3	27·0
Number of Wet Days...	21·0	13·0	18·0	13·0	14·0	17·0	14·0	26·0	17·0	10·0	12·0	14·0	189·0

nitrate, 1·0; silica and alumina, 0.5; and organic matter with traces of ammonia, 1·9. These results do not differ very materially from those obtained by Dr. Dundas Thomson, and reported in the weekly returns of the Registrar General; and they show that the water is of good quality and is well-suited for domestic purposes. Another advantageous property of the water is, that it is entirely without action on lead, and may therefore be stored in lead vessels, and distributed by lead pipes, without danger to the public health.

The quality of the water supplied by the City pumps is very different from that of the New River, for instead of an average of only 19 grains of solid matter per gallon, the water contains from 20 to 127 grains. Taking the pumps in the order of their foulness, they stand as follows: —Bishopsgate-street Without, 127·3 grains per gallon; Aldgate pump, 109·5; Cock and Hoop-yard, Houndsditch, 89·2; Bishopsgate-street Within, 89; Bride-lane, 84·7; Bow-church-yard, 84·5; Fenchurch-street, 83·1; Little Britain, 83; Basinghall-street, 81·6; Chequer-yard, Dowgate-hill, 81·1; Bell-yard, Gracechurch-street, 80; Idol-lane, 78·5; Ironmonger-lane, 76·2; Bartholomew-lane, 75·3; Cornhill, 74·8; Bowling-square, White Lion-street, 71; Half-moon-passage, 70·5; Great St. Helen's, 53·3;

Table IV.—Mean Composition of the Thames Water at High Tide at London Bridge during each Quarter of the Year 1860.

	1st Quarter. January to April.		2nd Quarter. April to July.		3rd Quarter. July to October.		4th Quarter. Oct. to Dec.		Whole Year.	
	Mid-stream.	Near Shore.	Mid-stream.	Near Shore.	Mid-stream.	Near Shore.	Mid-stream.	Near Shore.	Mid stream.	Near Shore.
Appearance on standing	Clear.	Slightly turbid.	Slightly turbid.	Slightly turbid.	Slightly turbid.	Slightly turbid.	Clear.	Clear.	Clear.	Slightly turbid.
Odour of the Water	None.	Faint.	Faint.	Faint.	Very faint.	Very faint.	None.	None.	None.	Faint.
Colour of the Deposit	Brown.	Brown.	Brown.	Brown.	Brown.	Brown.	Brown.	Brown.	Brown.	Brown.
Dissolved Constituents	25·4	24·4	28·5	26·1	50·4	47·0	26·7	25·0	32·2	30·7
Organic	2·6	2 4	3·2	2·9	4·1	3·9	3·2	2·9	3·3	3·1
Mineral	22·8	22·0	25·3	23·2	46·3	43·1	23·5	22·1	28·9	27·6
Suspended Matter	11·3	7·5	4·9	5·1	3·4	4·2	6·2	8·0	6·4	6·1
Organic	1·8	1·4	1·1	1·3	0·8	1·0	1·6	1·8	1·4	1·4
Mineral	9·5	6·1	3·8	3·8	2·6	3·2	4·6	6·2	5·0	4·7
Total per gallon (grains)	36·7	31·9	33·4	31·2	53·8	51·2	32·9	33·0	38·6	36·8
Ammonia per gallon (grains)	1·2	1·3	1·7	1·6	1·6	1·2	0·8	0·8	1·3	1·2
Combined Sulphuric Acid (gr.)	2·7	2 5	2·4	2·5	3·4	3·2	2·1	1·9	2·6	2·5
Alkaline Chlorides (grains)	3·7	3·2	5.2	4·8	26·6	23·1	5·6	4·2	10·1	9·0
Mean Temperature of River	40·4		53·2		60·7		46·6		50·2	
Highest „ „	48·0		62·0		64·5		55·5		64·5	
Total Rain-fall (inches)	3 9		9·4		9·1		4 6		27·0	
Number of Wet Days	52·0		44·0		57·0		36·0		189·0	

Table V.—Mean Composition of Thames Water at High Tides at London Bridge, during the Spring and Summer Months of 1858, 1859, 1860, and 1861.

Properties of the Water and Constituents per Impl. Gallon (Grains).	May.			June.				July.			August.		September.	
	1859.	1860.	1861.	1858.	1859.	1860.	1861.	1858.	1859.	1860.	1859.	1860.	1859.	1860.
Appearance after standing	Turbid	Slightly turbid.	Clear.	Turbid.	Turbid.	Slightly turbid.	Clear.	Turbid	Turbid.	Slightly turbid.	Turbid	Slightly turbid.	Turbid	Slightly turbid.
Odour of the Water	Bad.	Faint.	None.	Very bd.	Very bd.	Faint.	None.	Bad.	Very bd.	Faint.	Bad.	None.	Bad.	None.
Colour of the Deposit	Black.	Brown.	Brown.	Black.	Black.	Brown.	Brown.	Black.	Black.	Brown.	Black.	Brown.	Black.	Brown.
Dissolved Constituents	94·0	32·0	31·3	140·0	74·6	23·8	42·6	157·8	192·5	34·9	302·9	53·5	410·1	62·8
Organic	6·9	3·1	3·5	12·8	7 2	4·2	4·3	15·8	16·1	2·8	20 0	4·1	23·3	5·5
Mineral	87·1	28·9	27·8	127·2	67·4	19·6	38·3	142·0	176·4	32·1	282·9	49·4	386·8	57·3
Suspended Matter	9 5	6·2	4·2	7·2	13·7	6·9	5·2	16·7	8·8	1·8	8·0	3·7	6·5	4·8
Organic	1·7	1·3	1·1	1·6	1·6	2·1	1·2	3·3	2·1	0·4	2·3	1·0	1·6	1·1
Mineral	7·8	4·9	3·1	5·5	12·6	4·8	4·0	13·4	6 7	1·4	5·7	2·7	4·9	3 7
Total per gallon (grains)	103·5	38·2	35·5	147·2	88·3	30·7	47·8	174·5	201·3	36·7	310 9	57·2	416·6	67·6
Ammonia per gallon (grs.)	1·2	2·7	1·1	1·4	1·0	1·0	0·8	0·7	1·3	1·8	1·3	1·3	1·3	1·7
Combd. Sulph. Acid per gal. (grs.)	7·1	2·6	2·5	8·6	5·7	2·2	3·0	9·8	14·1	2·7	20·6	3·0	27·3	4 5
Alkaline Chlorides „ „	65·6	7·6	9·8	107·5	52·6	2·7	19·4	121·3	174·6	13·3	225·4	28·5	328·9	38·1
Mean Temperature of River.	54·0	55·4	54·2	66·8	65·0	57·9	61·3	65·3	71·3	62·6	68·4	61·0	61·8	58·4
Highest „ „	61·7	62·0	60·8	72·4	67·2	60 0	67·0	70·4	75·4	64·5	71·9	62·5	66·7	61·0
Total Rain-fall (inches)	2·0	3·7	1·8	1·2	1·9	4·6	1·9	2·4	2·4	2·7	0·9	3·7	2·2	2 7
Number of Wet Days	9·0	14·0	8·0	5·0	7·0	17·0	15·0	12·0	7·0	14·0	11·0	26·0	17·0	17·0

Gutter-lane, 45·7; Honey-lane Market, 44·2; Guildhall-buildings, 28; and Glovers'-hall-court, 19·8. The quantity of organic matter in them ranges from 1·5 grains per gallon to 8·8; the common salt from 2·7 to 25; the sulphate of lime from 2 to 29; the alkaline nitrates from 2·1 to 24·6, and the combined ammonia from 0·5 to 2 grains per gallon. These results show that the City pumps are not only charged with decaying organic matter, but also with the saline products of its oxydation: the ammonia, for instance, is a sign of present putrefaction, and the alkaline nitrates of a past; besides which, the existence of so large a quantity of common salt, is suggestive of the filthiest impurities, as, for example, the fluid matters discharged from the human body, and the percolations from cesspools and sewers. Most of the waters are bright and sparkling, and they have a cool and agreeable taste. They are, therefore, much sought after for drinking purposes; but the coolness of the beverage, and the briskness of its appearance, are dangerous fascinations, for they are both derived from organic decay. Dead and decomposing matters have accumulated in the soil, and have been partially changed by its wonderful power of oxydation, and thus converted into carbonic acid and nitre. These have given to the water the agreeable qualities which are so deceptive. In reality the water from the City pumps is far worse than that from the muddy river, from which it is in great part derived; indeed, it may, at any moment, become charged with the active agents of disease; for no one can say when the salutary influence of the soil may fail by being worn out or overtaxed, and then the putrid organic compounds will pass into the wells unchanged. Many of the pumps are in close proximity to the fat graveyards of the City, and it is more than probable that all of them derive a portion of their water from these sources, for they are the principal gathering grounds for the surface springs; in fact, they are the only open spaces through which the rain can percolate to reach the shallow wells. Hereafter, when I have completed the inquiry into all the City pumps, I shall discuss this matter more fully; now, however, I merely direct attention to the general foulness of the water, and to the danger which may arise from the use of it. In Table VI. I have shown the compositions of those wells which have already been examined.

With regard to the general sanitary work for the quarter, the inspectors have furnished me with returns of the inspection of 1,514 houses, and of 798 visits to the common lodging-houses of the City. These have resulted in the issuing of 715 orders for sanitary improvement.

The markets and slaughter-houses have also been duly inspected, and the officers have seized 26,013 lbs., or nearly 26 tons, of meat, and 690 head of game and poultry, as unfit for human food. It consisted of 154 sheep, 15 calves, 21 pigs, 190 quarters of beef, 209 joints of meat, 224 pigeons, 210 fowls, 58 wild fowls, 56 ducks, 36 rabbits, 23 hares and leverets, 20 geese, 59 ruffs, and 4 plovers. All the game and poultry was putrid; but of the meat 15,352 lbs. were diseased, 4,120 lbs. were putrid, and 6,541 lbs. were from animals that had died from natural causes. Most of the meat was seized in Newgate Market by Mr. Fisher and Mr. Newman, and the game and poultry in Leadenhall by Mr. Davidson. It is but right to state, that the salesmen have given great assistance to the officers in the execution of this part of their duties, by informing them of the arrival of the meat at the market, and by giving up the names and addresses of the senders. In this way we have been able to institute proceedings against the most flagrant offenders; and during the quarter, three persons have been convicted at the Old Bailey of the offence of sending diseased meat to the City markets. In two cases the punishment was imprisonment, and in the third a penalty of £20. These proceedings have had the effect of checking the supply of bad meat to the markets, for the total amount seized during the quarter is not half so much as that of the preceding quarter; and during the last month the quantity has fallen off very considerably.

Arrangements have been entered into with Mr. Ford, of Belle Isle, for the destruction of the meat thus seized; and to ensure its not being used as food, a chemical treatment is about to be adopted before the meat leaves the custody of the Inspectors.

The last point to which I have to refer, is the working of the Act for preventing the sale of adulterated food. Only six applications have been made to me during the quarter for the analysis of articles suspected to be adulterated; two of these were for beer, one for bread, one for milk, and one for cooked ham. Both of the samples of beer were of inferior quality, and one was adulterated with a sweet material, like liquorice; the bread also was of inferior flour, but the other things were sound.

TABLE VI.—TABLE OF THE MEAN COMPOSITION OF THE NEW RIVER WATER, AS SUPPLIED TO THE CITY, DURING THE SPRING QUARTER OF 1861; OF THE THAMES AT HIGH TIDE; AND OF THE WATER FROM SOME OF THE CITY PUMPS.

SOURCES OF THE WATER.	CONSTITUENTS PER IMPERIAL GALLON.							
	Carbonate of Lime and Magnesia.	Sulphate of Lime.	Alkaline Sulphate.	Alkaline Chloride.	Alkaline Nitrate.	Silica, Alumina, &c.	Organic Matter.	TOTAL.
	grains	grains	grains	grains	grains	grains	grains	grains
New River Company	12·6	1·9	0·2	1·2	1·0	0·5	1·9	19·3
Thames, high tide at London bridge	11·7	4·3	0 6	11 1	2·0	0·4	3·7	33·8
Pump in Bishops-gate-st. Without	34·5	27·4	7 9	24 6	24·6	1·9	6·4	127·3
Pump in Aldgate ...	26 2	25·8	...	25·0	24·3	1·1	7·1	109·5
Pump in Cock and Hoop-yard, Houndsditch ...	26·6	20·0	...	14·7	20·0	1·0	6·9	89·2
Pump in Bishops-gate-st. Within	2·47	17·0	...	17·5	20·2	1·3	5·3	89·0
Pump in Bride-lane	11·5	21·5	...	22·5	19·5	0·9	8·8	84·7
Pump in Bow Churchyard ...	29 6	15·1	4·2	21·2	7·6	0·9	5·9	84·5
Pump in Fen-church-street ...	21·0	18·3	...	14·2	22·4	0·6	6·6	83·1
Pump in Little Britain	27·9	10·2	15·2	13 8	5·8	1·9	8·2	83 0
Pump in Basing-hall-street	23·4	29·0	3·0	12·6	7·8	0·9	4·9	81 6
Pump in Chequer-yard, Dowgate-hill	15 9	18·9	...	12·4	24·6	1·3	8·0	81·1
Pump in Bell-yard, Grace-church-street ...	19·3	12·8	...	19·1	19·6	1·0	8·2	80·0
Pump in Idol-lane...	16·8	16·6	...	16·3	22·4	1·8	4·6	78·5
Pump in Iron-monger-lane ...	19·8	16 3	5·2	10·6	7·0	1·6	5·7	76·2
Pump in Bartho-lomew-lane ..	23·3	14 3	0·4	16·7	15·1	0 9	4·6	75·3
Pump in Cornhill...	25·0	15·7	1·1	14·0	12·9	1·6	4·5	74·8
Pump in Bowling-square, White Lion street......	18·0	25·2	5·0	8·2	7·8	1·1	5·7	71·0
Pump in Half-Moon-passage...	18·0	14·5	...	18·7	15·7	0·9	2·7	70·5
Pump in Great St. Helen's	15·8	9·5	0·7	8·1	14·0	6·8	4·4	53·5
Pump in Gutter-lane	15 5	9·0	1·6	5·7	7·9	0·9	5·1	45·7
Pump in Honey-lane market ...	15·1	6·1	3·7	11·4	4·4	1·4	2·1	44·2
Pump in Guild-hall-buildings...	13·4	1·9	3·0	5·3	2·1	0·3	2·0	28·0
Pump in Glovers'-hall-court	10·9	2·0	..	2·7	2·2	0·5	1·5	19·8

In every case the water from the City pumps was clear, and of a slight greenish tinge. It was exceedingly hard, and was without action on lead.

Home Correspondence.

EXAMINATION PRIZE FUND.

Sir,—As the Programme of the Examinations of the Society of Arts for 1862 is on the eve of publication, I am desirous to call attention to the Prize Fund.

The prizes offered and received during the last seven years have had an excellent effect in encouraging young men and women to study and to undergo examination; and I know of few, if any, means by which education can be so well promoted by a small contribution as through the medium of our Prize Fund.

His Royal Highness, the President of our Society, having been pleased this year to announce his intention of giving annually a special prize of 25 guineas to the candidate, male or female, who (obtaining a certificate of the first class in the current year) shall have obtained in that year and in the three years immediately preceding it, the greatest number of such certificates, a new and powerful inducement to perseverance year after year in study is held out, and there can be no doubt that this Royal Prize will be ardently desired and keenly contested. It will be the "Blue Ribbon" of the examinations.

Besides the two prizes of £5 and £3, which are offered in each of our twenty-nine subjects of examination, additional prizes are this year offered in certain of those subjects which appear to the donors to need a little extra stimulus. These extra prizes, as far as is known at present, are in "Practical Mechanics" (the Rev. Canon Prower,) "Animal Physiology in relation to Health" (Mr. Harry Chester,) "Botany" (Dr. Lindley,) "Agriculture" (Mr. J. C. Morton,) "Mining and Metallurgy" (Sir Thomas Phillips,) "Political and Social Economy" and "Domestic Economy" (the Dean of Hereford,) "English History" and "English Literature" (Mr. Wentworth Dilke).

There are a few other subjects, such as "Navigation and Nautical Astronomy" and "Chemistry," in which extra prizes, amounting to £5, might, with great advantage, be placed at the Council's disposal; and our General Prize fund is much in want of replenishment.

I am, &c., HARRY CHESTER.

Purley Hall, near Reading, Aug. 6, 1861.

CHARCOAL AIR-FILTERS.

Sir,—I observe that Mr. Jasper W. Rogers, the patentee of the peat charcoal, in your *Journal* of the 2nd August, continues to accuse me of appropriating certain of his alleged discoveries, relating to the employment of charcoal for sanitary purposes, and especially the invention of the charcoal air-filter. Mr. Rogers carefully avoids answering my challenge to bring forward any printed statements, dated previously to 1854, announcing the fact that charcoal is an oxidizer; neither has he produced a published description of his air-filter of a similar date, but continues to refer to his experiment at Windsor, which I still maintain was not an air-filter at all.

As I have already mentioned, my attention was first directed, toward the close of 1853, to the deodorising and disinfecting properties of charcoal; and I was not long in discovering that the views which had been previously entertained were exceedingly erroneous; for instead of acting as an antiseptic, and thereby retarding the decay of putrifying substances with which it was in contact, its action was the very reverse of this. Charcoal, therefore, from the considerable amount of condensed oxygen contained within its pores, amounting to between nine and ten volumes, not only absorbs, but rapidly oxidizes the effluvia and miasmata emitted by decaying substances, and resolves them into the simplest combinations they are capable of forming—their carbon being converted into carbonic acid and their hydrogen into water.

The first application which I made of the charcoal air-filter (which consisted of a layer of charcoal of the size of peas, enclosed between two sheets of wire gauze,) was to the construction of respirators, for protecting the wearer against contagious diseases, the miasmata being removed from the air by filtration through the charcoal.* These respirators were first publicly exhibited and described by me, and the oxidizing power of charcoal announced on the 22nd February, 1854, before the Society of Arts, as may be seen by reference to the *Journal*, Vol. II., p. 245. These respirators were manufactured for me by Mr. Fergusson, of Giltspur-street, instrument maker to St. Bartholomew's Hospital. A somewhat improved form of the respirator was soon after manufactured by Mr. W. B. Rooff, of 7, Willow-walk, Kentish-town, who still continues to make them, and by whom some thousands, I believe, have been sold. Similar respirators were likewise manufactured by Messrs. Darby and Gosden, 140, Leadenhall-street; and by Mr. Alfred Allchin, pharmaceutical chemist, Barnsbury-road, Islington.

In a letter to the Society of Arts, of the 9th of June, 1854, I proposed to employ charcoal ventilators, or air-filters, consisting of a layer of charcoal, in fragments from the size of a pea to that of a large bean, to water-closets and houses, to ships, and to sewers. Within two or three months after that date air-filters, or charcoal ventilators, each of them several feet in diameter, were fitted up by Mr. Rooff, both at the Mansion-house and Guildhall, where I believe they still continue in operation.

On the 22nd November, 1854, I published a letter in the *Times*, in which these and many additional details were enumerated. This letter was subsequently published as a pamphlet, and extensively distributed, and it was afterwards copied entire into that very popular work, "Enquire Within Upon Everything." (Houlston and Wright, Paternoster-row.)

On Friday evening, March 2nd, 1855, I delivered a lecture "On the Economical Application of Charcoal to Sanitary Purposes," at the Royal Institution, Albemarle-street. This lecture, which contained the preceding and many additional details, was subsequently published, first by Highly, and then by Churchill, and went through three editions.

In the course of the summer of 1855, in conjunction with Dr. Forbes Watson, now Examiner of Products to the Council of India, I fitted up two rooms at our joint expense at 73, Great Russell-street, Bloomsbury-square, where every variety of charcoal respirator, and a series of charcoal air filters, combined with the blowing apparatus intended to ventilate hospitals, barracks, and other large buildings, in tropical climates and unhealthy situations, were exhibited during a number of weeks to many hundred individuals. These respirators and air-filters were subsequently transferred to the Polytechnic Institution, where they were continuously exhibited for three or four years. I was likewise in the habit of exhibiting a similar set of respirators and air-filters, and explaining their operation before a numerous class of medical students, in the course of my lectures at St. Bartholomew's Hospital, during a similar period.

Soon after the publication of the lecture delivered at the Royal Institution, Mr. Robert Rawlinson, C.E., was induced to apply the charcoal filter in the beginning of the year 1856 to the air shafts of sewers. During the last five years Mr. Rawlinson has applied these filters to the ventilation of sewers on a large scale at West Ham, near London, at Swansea, Worksop, Buxton, and other places, I believe to the extent of 500 filters in all.

In 1858, Dr. Letheby, Health Officer of the City of London, after a minute and rigorous examination of the methods proposed for the disinfection of the sewers of London, recommended that charcoal air-filters should be employed, and during the last eighteen months Mr. Haywood, the well-known engineer to the City Commissioners of Sewers, has fitted up the whole of the Shoreditch district, comprising 59 acres, with 103 charcoal ventilators.

* These respirators were, in fact, air-filters applied to the mouth.

All the charcoal air-filters which have hitherto been applied to sewers contain only wood charcoal, in pieces of from the size of a nut to that of a walnut, and even larger, and amount to about 600, their number being constantly on the increase. Both Dr. Letheby, Mr. Rawlinson, and Mr. Haywood declare that they have derived their information concerning charcoal filters solely from my publications.

Such, then, is a statement of my case, and I leave it to the public to determine whether the claims which I have advanced with regard to the discovery of the oxidating power of charcoal, and the invention of the charcoal air-filters, are well or ill founded. At any rate, I think it must be admitted that the thing, so far as I am concerned, has not been done in a corner, and fortunately the numerous individuals who have assisted me with their cooperation are well known and producible.

In conclusion, perhaps, I may be allowed to quote an observation of Baron Liebig, which I heard from him in the course of conversation many years ago, namely, that almost every important discovery or invention passes through four stages in the course of its development. First stage: The invention or discovery is made by somebody. Second stage: It is generally pooh-poohed, but gradually adopted by a few discerning individuals. Third stage: It comes to be pretty generally adopted and its merits appreciated. Fourth stage: A violent controversy arises as to who is the author of the discovery or invention. I think it is now pretty apparent that the charcoal air-filter has reached the fourth stage of its development, and that its friends and patrons may now shortly expect to see it almost universally adopted.

I am, &c.,
JOHN STENHOUSE.

Sir,—Pray allow me to note the following typographical errors which appear in my letter published in the last *Journal*.

The fourth paragraph, as intended, should have been, " That the vitiated air passed through the wall (which Dr. Stenhouse says would have effectually prevented it) and blackened the paint of the doors."

And in the following paragraph, where I say " I placed the charcoal to intercept the *foul* air," the printer has made the word " fresh." I am, &c.,

JASPER W. ROGERS.

Peat-house, Robertstown, County Kildare,
5th August, 1861.

Proceedings of Institutions.

Bromley Literary Institute. — The Fifth Annual Report congratulates the members on the prosperous state of the Institute. The members during the year number 174. The library is gradually augmenting, and the crowded state of the shelves is already pressing upon the Committee the necessity of providing more space for books than the present rooms afford. The Committee think that it would be desirable to secure for the Society a site for a building, which should include a lecture-room capable of holding at least 500 persons. The Committee are encouraged in this view by the fact that other towns, with less advantages, perhaps, than those possessed by Bromley and its neighbourhood, have already accomplished the task of providing for themselves suitable Institute buildings. After full consideration, the Committee venture to hope that, on a convenient site being found, the funds required for the erection of a structure adequate to the wants of the Bromley Literary Institute (and adapted to be used occasionally, if required, for the administration of justice) might be locally raised, partly by voluntary contributions, and partly by means of a Joint-Stock Company with limited liability, in £10 shares, exchangeable at any time, at the option of the holder, into life-member tickets. The proceeds of lectures delivered in a room of enlarged area, and the annual subscriptions accruing from a probable increase in the number of members, would materially assist in the arrangement. The vote of £10, granted in the early part of last year to the library fund, has been expended in the purchase of carefully-selected books, and a further sum of £10 has been recently appropriated to the same fund, to meet the increasing demand on the part of the members for general literature and popular works. Lectures upon various subjects and entertainments have been given by gentlemen, whose gratuitous services the Committee thankfully acknowledge. It has more than once occurred, particularly on occasions of Christmas entertainments, that a large number of members and others have been unable to gain admission, on account of want of space, in the largest assembly room that could be found in our town for the purpose. The following is a statement of the lectures and entertainments during the year 1860:—" Dramatic Selections," T. F. D. Croker, Esq.; " On the Arctic Regions," Rev. H. C. Adams; Entertainment, Mr. Basil Young; " George Stephenson," C. Wykeham Martin, Esq.; " On Memory," Dr. Edward Pick; " On Charles Lamb and his Essays," H. Deane, Esq., jun.; " On Robert Burns," A. Hamilton, Esq.; and a Christmas Entertainment, by Members. The financial statement shows that the receipts have been £151 8s. 3d., and that there is a balance in the hands of the Treasurer of £6 3s. 2d.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, August 2nd*, 1861.]

Dated 19th March, 1861.

687. B. West, 2, St. James'-walk, Clerkenwell—Imp. in cutting and ornamenting the edges of books, paper, vellum, and other substances, and in apparatus connected therewith.

Dated 1st April, 1861.

800. R. Searle, Woodford Wells, Essex—Imp. in the manufacture and insulation of telegraph cables and telegraphic wires in general, and of apparatus for laying marine telegraph cables.

Dated 10th April, 1861.

880. A. Lamb, Southampton—Imp. in condensers.

Dated 17th April, 1861.

944. B. Brown and R. Hacking, Bury, Lancashire—Certain imp. in machinery or apparatus employed in spinning cotton, wool, silk, and other fibrous substances.

946. H. A. F. Duckham, Clerkenwell-green—Imp. in gas meters and regulators, and in compounding materials to be used as a coating for or in the composition of substances subject to the action of gas.

Dated 12th June, 1861.

1505. H. Mason, Ashton-under-Lyne—Imp. in machinery or apparatus for preparing and spinning cotton or other fibrous materials.

Dated 13th June, 1861.

1516. E. Chatonet, jun., La Rochelle, France—An improved machine or apparatus for manufacturing the covers of tin or other metal cases.

Dated 21st June, 1861.

1602. W. Hobson and T. Cavill, Sheffield—An improved piston.

Dated 29th June, 1861.

1666. W. Clark, 53, Chancery-lane—Imp. in the distillation of solid and liquid combustible matters. (A com.)

Dated 3rd July, 1861.

1688. J. Simonton, Belfast—An improved traction engine and apparatus applicable for the cultivation of land.

Dated 4th July, 1861.

1702. W. E. Newton, 66, Chancery-lane—Imp. in engines for obtaining motive-power by the electric force of steam and air combined, part of which imps. may be employed for sounding steam whistles. (A com.)

Dated 9th July, 1861.

1735. A. Priest and W. Woolnough, jun., Kingston-on-Thames, Surrey—Imp. in machinery for drilling and hoeing land.

Dated 11th July, 1861.

1753. W. Wilkinson, Bayswater—Imp. in manufacturing and ornamenting brushes, parts of which are applicable to ornamenting baskets and articles of furniture and to protecting silver on glass.

1755. H. Ashwell, New Basford, Nottinghamshire—Imp. in apparatus for washing, cleansing, scouring, getting up, dyeing, boiling, and steaming.

Dated 12th July, 1861.

1756. T. J. Smith, Queen-street, Cheapside—Imp. in photographic albums.
1759. S. Berchtold, 48, Frith-street, Soho—Imp. in perpetual calendars to be used either separately or in connection with watches or clocks.

Dated 13th July, 1861.

1763. I. Beamish, Liverpool, and N. Beamish, Egremont, Cheshire—Imp. in lubricating those parts of steam engines acted on by the steam, and in apparatus for the same, which said apparatus can be used for other purposes.
1767. T. Smith and G. Taylor, Ipswich—Imp. in horse rakes and cultivators, and in wheels for the same and other carriages.

Dated 15th July, 1861.

1768. T. Woycke, America-square, Minories—An imp. in the manufacture, construction, and production of the heels and the uppers immediately above the heels of boots and shoes for imparting durability and permanency of form to the said heels and uppers.
1769. E. Briggs, Castleton Mills, near Rochdale, and S. Fearnley, Rochdale—Imp. in the manufacture of piled fabrics, and in the machinery or apparatus employed in manufacturing piled and other fabrics.
1770. T. Walker, jun., Otley, Yorkshire—Certain imp. in apparatus for polarising light applicable to microscopes and other optical instruments.
1771. G. Treble, jun., Aldersgate-street—An imp. in show cases.
1772. T. Cobley, Meerholz, Germany—Imp. in the manufacture of metallic and earthy silicates or siliceous compounds of the same from the metallic and earthy bases or their salts and soluble alkaline, silicates, the formation of alkaline acetates or caustic alkalies, and application of the same.
1777. B. Browne, 52, King William-street—Improved machinery for clearing and smoothing spun thread or yarns and other similar fibrous materials. (A com.)
1778. A. Topham, J. Topham, and J. Topham, St. Pierre les Calais, France—Imp. in the manufacture of lace.
1779. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in machinery or apparatus for cleaning rice. (A com.)
1781. W. Rigby, Glasgow—Imp. in the manufacture of armour plates for defensive purposes.
1782. J. Mabson, Newcastle-upon-Tyne—Imp. in sewing machines, particularly applicable to quilting and braiding.
1783. E. G. Fermier de la Provotais, 29, Boulevart St. Martin, Paris—Extracting the fibres from genista scoparia (broom) and their application to manufacturing paper and fabrics, and also treating the washing waters so as to obtain dyeing products therefrom.
1784. W. Clark, 53, Chancery-lane—Imp. in stage scenery and apparatus. (A com.)

Dated 16th July, 1861.

1785. J. Mapple, 2, Newman's-place, Kentish-town—Imp. in telegraphic apparatus.
1787. J. S. Wells, Mount-street, Nottingham—An improved needle used in the manufacture of looped fabrics.
1788. J. Blinkhorn, Chorley, Lancashire—Imp. in machinery or apparatus for working railway signals.
1789. R. Jones, Camden-town—Imp. in safety lamps.
1791. D. Holder, jun., Thornhill-road, Barnsbury—Imp. in foot and kneeling stools.
1792. C. D. Abel, 20, Southampton-buildings, Chancery lane—Certain new alloys of silver with other metals, and the processes employed in their manufacture. (A com.)
1793. W. Palmer, Sutton-street, Clerkenwell—Imp. in lamps.

Dated 17th July, 1861.

1797. J. Parker, Ivy-house, Bradford, J. Wells and B. Wells, Bowling, near Bradford—Imp. in steam engines, boilers, furnaces, and apparatus applicable thereto.
1798. J. Mason, Birmingham—An imp. or imps. in metallic pens. (A com.)
1799. C. E. Redfern, 10, Saint Paul-street, New North-road, Islington—Imp. in the construction of locks, and adaptation thereof to various useful purposes.
1800. W. O. Brooke, Westminster—Imp. in apparatus for suspending and insulating electric telegraph wires.
1802. A. V. Newton, 66, Chancery-lane—An improved process and improved machinery for obtaining fibres from the stalks or leaves of fibre-yielding plants. (A com.)
1803. J. Trigwell, Terminus-street, Brighton—Imp. in slide valves.

Dated 18th July, 1861.

1804. S. Tawell, Aldermanbury—An imp. in or addition to the selvages of laces and other woven fabrics.
1805. A. Elliott, Manchester—Certain imp. in looms for weaving.
1808. M. E. Guaymard, 29, Boulevart St. Martin, Paris—Imp. in the manufacture of shirt fronts, collars, and cuffs.
1809. J. Tillotson, Bolton—Certain imp. in the manufacture of pawnbroker's duplicate tickets, and in the apparatus connected therewith.
1810. P. Williams, Salford, and T. Parkinson, Bury—Certain imp. in carding engines for carding cotton and other fibrous substances.
1812. G. Coles, Gresham-street West, J. A. Jaques and J. A. Fanshawe, Tottenham—Improved apparatus to be used for brushing and dressing cloth.
1813. J. A. Jaques and J. A. Fanshawe, Tottenham—An improved apparatus for a mode of stopping, plugging, or closing inkstands, bottles, and other vessels of capacity.
1814. J. W. Rogers, Peat-house, Roberts-town, Kildare, Ireland—An improved mode of building ships and floating batteries, applicable also in part to the construction of fortifications.

Dated 19th July, 1861.

1815. R. Walker, Eccleston, near Prescot—An improved apparatus for stopping and packing bottles.
1816. D. Gallafent, 15, Stepney-causeway—Certain imp. in refrigerators for cooling liquids.
1818. P. Shaw, Boston, U.S.—Imp. in hot air engines.
1819. R. Laing and G. R. Cossins, Ince, near Wigan—An improved mode of obtaining nitrous acid gas for making sulphuric acid.
1820. R. C. Newbery, President-street West, Goswell-road—Imp. in the manufacture of enamelled cards.
1821. W. Savory and P. H. Savory, Gloucester—An improved winding apparatus particularly adapted for steam ploughing, winding at pits, quarries, and other such like purposes.
1822. M. Henry, 84, Fleet-street—Imp. in the production of paper pulp and in bleaching paper pulp and certain fabrics, also in apparatus for cutting wood applicable for carrying out part of the invention. (A com.)
1824. R. A. Brooman, 166, Fleet-street—Imp. in breech-loading ordnance, applicable also to small arms. (A com.)
1826. W. E. Newton, 66, Chancery-lane—Improved apparatus for copying letters or writings and draughts. (A com.)

Dated 20th July, 1861.

1827. E. T. Hughes, 23, Chancery-lane—Imp. in machinery or apparatus for manufacturing woven seamless gloves. (A com.)
1829. W. Price, Lambeth—Imp. in tools for cutting shives and other conical blocks.
1831. T. Roberts and J. Dale, Manchester—Imp. in the manufacture of gunpowder.
1833. J. Cole and J. Cole, Coventry—An imp. in the construction of watches, &c.

Dated 22nd July, 1861.

1835. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Imp. in safety locks. (A com.)
1837. A. Watson, Johnstone, N.B.—Imp. in brake apparatus for common road vehicles.
1839. W. Hood, Reading—Imp. in beams and girders, and in applying the same in buildings.
1841. J. Beattie, Lawn-place, South Lambeth—Imp. in arrangements in buildings and ships with a view to the extinguishment of accidental fire therein, and also the ventilation thereof.

Dated 23rd July, 1861.

1843. G. F. Griffin, New Adelphi-chambers—Imp. in the permanent way of railways.
1847. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in forges. (A com.)
1849. W. Clark, 53, Chancery-lane—Imp. in apparatus for the condensation of steam in marine engines, and in the particular application of parts thereof to the ship. (A com.)

Dated 24th July, 1861.

1851. T. Hughes, Birmingham—An improved steam generator.
1855. H. Neville, Portsmouth—Improved apparatus for taking photographs.

Patents Sealed.

[*From Gazette, August 2nd*, 1861.]

August 2nd.
121. E. Stevens.
297. G. Williams.
304. A. Drevelle.
306. T. Gee.
308. C. W. Forbes.
311. J. Beesley.
315. T. Blezard and J. Blezard.
319. R. Harrild and H. Harrild.
326. C. J. Richardson.
332. J. Lockwood.
367. W. Clark.
408. W. Clark.
1394. H. Allman.

[*From Gazette, August 6th*, 1861.]

May 6th.
314. A. Drevelle.
327. H. Withers.
331. J. Higgins and T. S. Whitworth.
335. A. Leidemann & T. Lange.
389. J. Braham.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, August 2nd*, 1861.]

July 29th.
1747. S. Hine.
July 30th.
1728. N. S. Dodge.
1769. J. J. Russell.
1784. C. Mather.
1810. H. Clayton.
1811. W. Smith.
July 31st.
1766. C. Callebaut.

[*From Gazette, August 6th*, 1861.]

August 1st.
1764. A. V. Newton.
1834. George Houghton.
August 2nd.
1762. J. H. Johnson.
1782. John Henderson.
1783. D. McCrummen.
August 3rd.
1799. J. Smith.

Journal of the Society of Arts.

FRIDAY, AUGUST 16, 1861.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £426,300, have been attached to the Deed.

The following information has been received by Her Majesty's Commissioners:—

United States of America.

A joint resolution has passed both Houses of the United States' Congress, authorising the President to take such measures as he shall seem expedient to facilitate a proper representation of the industrial interests of the United States at the forthcoming Exhibition, and that a sum of 2,000 dollars is appropriated for the incidental expenses.

NOTICES TO INSTITUTIONS.

The Secretaries of those Institutions whose Members intend to join (with their friends) in the Excursion to the Crystal Palace, on the 27th inst., are requested to communicate with the Secretary of the Society of Arts without delay, stating the number of persons likely to be present.

The Council have communicated with every Railway Company whose line is likely to be traversed by the Excursionists from the Institutions, and have requested that such facilities may be afforded as will allow large numbers to take a part in the proposed gathering.

The arrangements for the supply of books, which had been temporarily suspended, are now renewed on the same terms as before, namely, a discount of 27½ per cent. allowed off books, and 25 per cent. off periodicals, except where such periodicals are irregular in price, such as the Quarterlies, in which case trade price only will be charged.

Forms for ordering books may be obtained on application to the Secretary of the Society of Arts, to whom all orders should be sent.

THE BRITISH COLONIES AND THE INTERNATIONAL EXHIBITION OF 1862.

By P. L. Simmonds.

No. II.—The North American Colonies.

With the exception of Canada, the British North American Colonies may also be said to have been unrepresented at the Exhibition of 1851, New Brunswick, it is true, sent a collection of raw and manufactured articles, principally grain and timber, but it was by no means a creditable display as regards the indigenous resources of the province. Nova Scotia, too, was poorly represented, and the collection from Bermuda was very small. Prince Edward Island did not appear. The Hudson's Bay Company may be said to have represented by their furs the whole territory of North-West America, which is now better known and appreciated by the colonies of the Red River Settlement, British Columbia, and Vancouver Island. The progress of British America in the past ten years, if not to be compared with the remarkable advance of Australia, has at least been steady and onward; agriculture, trade, and population have increased, and the material wealth and indigenous resources have been largely developed. The population of the British American colonies has increased, since 1851, by about one million and a half, and may now be taken at 4,000,000 souls.

In the past ten years, 235,285 souls have emigrated from the United Kingdom to the British American Colonies. The largest numbers left in 1851 and 1854, about 43,000 in each year. Within the past three years, there has been a general decline of emigration, and British North America has participated in this decline, only 9,000 emigrants, on an average, having proceeded there yearly. Many of these emigrants have probably crossed over into the States, but the number has in all probability been made up by negroes and other arrivals.

The value of the British exports to the North American colonies is now much the same as it was in 1851; but a large intercolonial and American trade is carried on. The progress of agricultural improvement in most of the colonies has been very great, and a considerable amount of wood land has been cleared in New Brunswick and Canada.

The timber trade is vigorously prosecuted, and shipbuilding actively carried on. Besides the large number of vessels disposed of, the comparison of vessels belonging to the North American Colonies stands as follows:—Owned in 1851, 5,460, registering 447,784 tons; in 1860, 6,779 ships and 600,224 tons. The extension of railways in Canada and the Lower Provinces has greatly facilitated the extension of trade and the progress of settlement. Canada has now about 2,000 miles in operation, and the increased value of real estate from this cause alone is estimated at over £30,000,000. The canals have been enlarged, the Victoria-bridge across the St. Lawrence cons structed, and many public buildings and great work erected. The value of the Canadian imports has doubled in the past ten years.

In 1850, the collective value of the imports into each North American colony was as follows:—

Newfoundland	£723,599
Canada	2,337,620
Prince Edward Island	70,830
New Brunswick	726,691
Nova Scotia	824,022
	£4,682,762

In 1859, it may be stated at:—

Newfoundland	£1,172,862
Canada	6,542,669
Prince Edward Island	186,229
New Brunswick	1,162,771
Nova Scotia	1,936,176
British Columbia and Vancouver	200,000
Bermudas	141,203
	£11,341,910

The gold discoveries of British Columbia have greatly improved the resources of that new colony, to which great attention has recently been drawn, and her colonies on the Pacific are calculated to be of inestimable future advantage to Great Britain, both as a naval station and as populous fields of British industry and enterprise.

Canada made a highly creditable display at the Paris Exhibition in 1855, and will, no doubt, be equally well represented in London next year; 348 exhibitors occupied 3,145 superficial feet of space at Paris.

Sir Edmund Head, in a despatch, dated Government House, Quebec, April 25, states that he has referred all the documents connected with the proposed Exhibition to the consideration of his Executive Council. Petitions were presented to the Canadian Parliament praying that a sum of 40,000 dollars might be appropriated to enable the province to make a creditable appearance at the International Exhibition. The Board of Arts and Manufactures for Lower Canada is also moving energetically in the matter, and there is no reason to doubt that Canada will stand equally well in 1862 as she did at London in 1851, and at Paris in 1855.

Newfoundland has never taken any interest in these competitive industrial shows. It took no direct part in 1851—some samples of cod liver oil alone were shown—and yet many industrial products might be exhibited illustrative of the extent and varied character of its fisheries. Mineral products have also attracted some attention here. Its fish manure, cranberries and other wild fruits, as well as models of boats and other articles of native manufacture might be exhibited.

As respects Prince Edward Island, Lieut.-Governor Dundas, in a despatch to his Grace the Duke of Newcastle, dated March 28, states that his Government will gladly co-operate with him in taking the necessary steps for the furtherance of the important objects of the Exhibition. With this in view, a competition will be invited among those who are in a position to supply the best specimens of the Industry and Natural Productions of the Colony. This competition is to take place soon after harvest, so as to allow a contribution of the various cereals of this year's growth. In addition to the finest samples of corn, wheat, &c., the staple produce of this island, the Governor states that he would also endeavour to select some specimens of the best woollen manufacture, as also of furnitures made in the colony out of native woods. These, he adds, will comprise the principal, if not the only contributions of Prince Edward Island. As the navigation closes here during the winter, and does not open sufficiently early in the spring, it will be necessary to ship these articles in the month of November.

In Nova Scotia the Right Hon. the Earl of Mulgrave has been most zealous in bringing the matter forward, so as to have the colony which he administers duly represented. Early in the year his Excellency brought the subject under the notice of his Government who, gave it their best attention, and at once laid it before the Legislature. Since then endeavours have been made to procure such specimens of the industry of the country as will tend to the credit of the colony. In a subsequent despatch, dated June 13, Earl Mulgrave informs the Duke of Newcastle that he has appointed the following gentlemen a Local Commission for the purpose of communicating with the Royal Commissioners in England, and also obtaining the best possible selection of articles for exhibition from Nova Scotia:—Hon. Jos. Howe, *Chairman*, A. G. Archibald, B. Weir, Dr. C. Tupper, John Esson, John Tobin, the Mayor of Halifax, P. C. Hill, Jas. A. Bell, W. Cunard, R. Moron, A. M. Uniacke, Jas. Thompson, and A. McKinlay. It is probable, he adds, that he may find it desirable to add to the list hereafter. No exertion will be wanting on his part for furthering this important object.

Nova Scotia will have some new products to show. Among others, specimens of her recent gold discoveries, a very beautiful bracelet, manufactured by Mr. W. H. Newman out of Tangier gold, has been made for Lady Mulgrave, the workmanship of which reflects much credit.

At the meeting of the New Brunswick Legislature, at Fredericton, on the 12th February, the Lieut.-Governor's speech contained the following paragraph:—"Under the provisions of the Act to establish a Provincial Board of Agriculture, the First Provincial Exhibition will be held this year. You may deem it wise to consider whether the inquiries and arrangements connected with this exhibition may not be combined with preliminary steps for the representation of the Province, both in natural products and articles of manufacture, at the Exhibition in London next year."

In July, the Governor announces the appointment of the following Local Commissioners:—The Hon. A. E. Botsford, Sackville, county of Westmoreland; James G. Stevens, Esq., St. Stephens, county of Charlotte, Secretary; Robert Jardine, Vice-Chairman, and Alexander Jardine, Esq., city of St. John; H. P. Bridges, Esq., Sheffield, county of Sunbury; Hugh McMonagle, Esq., Sussex, King's County; Wm. Napier, Esq., Bathurst, county of Gloucester; and J. Micheau Keator, Esq., Sussex, King's County.

The Provincial Board of Agriculture, of which the foregoing gentlemen are the Executive Committee, has since applied for the large area of 20,000 feet to be allotted for the use of the province of New Brunswick, as the probable space required, together with a wall surface of 300 feet.

The first exhibition of the Provincial Board of Agriculture is to be held at Sussex-vale, on the 1st October and three following days. The premium list, which is now before me, offers rewards for the best specimens of the following:—Raw materials—Best collection of New Brunswick minerals; ditto, useful minerals; combustible minerals; mineral paints, clays, and sand; best collection of building stones, dressed 10-inch cubes; ores or metals; bricks, tiles, pottery, and salt; manufactures chiefly in metal; agricultural implements; cutlery and tools; nails and horse shoes; steam engines; fire and garden engines; lathes; sewing machines; clocks; philosophical instruments. Vegetable kingdom—Grains and agricultural seeds; roots; dried and preserved fruits; hops, &c. Manufactures, chiefly in wood—Agricultural implements; dairy utensils. Cooper's work and shingles; clapboards; veneers; cabinet work; carved work; pumps; blocks; turners' work; basket work; musical instruments; looms; carts, waggons, and sleighs; four-oared and six-oared gigs; models of known ships; bark canoes; models of farm buildings, saw mills, wind mills, &c.; and best assorted collection of native woods. Amongst the miscellaneous manufactures to be shown are—Flours and meals; starches; maple sugar; biscuits and confectionery; grass and straw plait hats and bonnets; matting; cordage; paper; linen and cotton goods; native dye-stuffs and colours; cider and vinegar; live-stock are also to be shown; salted provisions, butter, and cheese; wool; oil; glue and isinglass; honey and wax; quill and hair work; horns and horn work; feather and down work; hatters', tailors', milliners', dyers', bookbinders', and other work; candles and soap; leather, furs, and skins; blankets, flannel, carpets and rugging, woollen cloth, hosiery, mixed and homespun; dried, smoked, pickled, and preserved meats; and stuffed birds and other native animals.

In Fine Arts—Oil paintings; water-colour, crayon, and pencil drawings; photographs; engravings; lithographs; sculptures; architectural and engineering drawings and designs, &c.

This show is to be preliminary and subservient to the collection for the International Exhibition, and from the variety and amount of the premiums, it promises to be most interesting and useful in developing the local resources and ability of the Province. 4,000 dollars have been voted by the Government for procuring suitable articles to be sent to London.

A recent number of the leading provincial journal, the *Courier*, of St. John, thus speaks of the matter:—It is to the fact that she was well represented at the last World's Exhibition that Canada occupies so prominent a position, and receives at the hands of influential men and capitalists so much attention. The productions of Canadian skill and genius created a feeling of inquiry in the minds of those who had previously been but indiffer-

ently acquainted with her position and resources; and the result has been a steady progress thereafter. If the fact of Canada being well represented at the last World's Exhibition has produced satisfactory results—and who can doubt it—will not the same cause produce a like effect upon New Brunswick? Most assuredly it will; and should we not, then, one and all, strive by every means in our power to have the Province well and respectably represented at a similar exhibition to be held in London next year? However, to do this more effectually it is necessary that we should, at the Provincial Exhibition to be held in Sussex-vale in October next, have our various manufactures, agricultural productions, etc., numerously and creditably represented. Cannot almost, if not every, mechanic throughout the Province prepare some specimen of his skill and industry? Cannot every agriculturist present some samples of the products of the soil? Cannot every artist prepare for exhibition some specimens of his genius? Cannot every manufacturing institution display before the gaze of the numerous assemblage of persons who will undoubtedly attend both exhibitions, something to be admired? Doubtless all can do something; and, when the advantages to be secured to the Province by a creditable display of our various products are clearly understood, those who fail to assist will be few indeed.

If ever there was a time when New Brunswick had a chance to become widely, and her varied resources more generally appreciated, it is the present. The recent visit of the heir-apparent to the British throne to the North American Provinces has attracted to New Brunswick no small degree of attention. The Prince and his illustrious suite were favourably impressed with the appearance of the country and its various advantages both natural and acquired; so also was the talented correspondent of the *Times*, and this latter personage gave expression to his views relative to our commercial, agricultural, and other advantages, in a manner highly eulogistic. To merit a continuance of this good opinion, and to secure to the Province increased advantages, it is necessary that those who represent the "bone and sinew" of the country should bestir themselves. Considering the importance of the forthcoming exhibitions to the material interests of the Province, we cannot, in a style too eloquent or a manner too earnest, urge upon those who can do something the necessity of entering into the matter heartily, vigorously, and with becoming earnestness.

The internal discord and dissension which now prevail in the United States will prevent the people of that country from being as fully represented at the World's Exhibition as they otherwise would, and will afford New Brunswick and the other Provinces, if properly represented, a better opportunity of making a favourable impression upon the minds of myriads who will throng from all parts of the world to view the various specimens of the ingenuity and skill of human hands which will there be presented to view.

Another paper, the *Colonial Advocate*, on the same subject says:—"We are very much in the habit of talking in exultant terms of the fine province we live in; and the *Times* correspondent last year told the reader of that paper how surprised he was at the rich agricultural aspect of the St. John river scenery; but John Bull is a man of facts, and not very easily led away by appeals to the imagination. If we, therefore, wish to prove on the other side of the Atlantic that we have a climate suitable for agricultural purposes, we must send samples of grain of different kinds, and flour made from our home-raised grain as well. When an Englishman handles wheat, and sees it in the New Brunswick department, it is sufficient proof of what our climate is capable of. So of any of our manufactures. Let well-made articles be exhibited, and our civilisation and our progress will be manifested better by the comparison of them with the workmanship of others, in similar departments, than if Prof. Johnston's Report could be given to everyone who will enter the Crystal Palace. His Excellency the Lieut.-Governor has remarked that he was never more impressed with the capability and importance of the Canadas than when he visited the Canadian department in the Crystal Palace, in 1856. Canada has had a rebellion—England lost one of her most heroic generals in Canada—but it took a tangible exhibition of the products of her fields and workshops, before the people of Great Britain could be made to fully realise what she could do; and New Brunswickers must be fully awake to this system of advertising their country if they want their great lands occupied by thriving farmers."

An official notice, advertised in the principal journals of the province, states that "the Provincial Government, having decided that New Brunswick should be properly represented at the Great Exhibition in London in 1862, and having authorised the Provincial Board of Agriculture to receive, select, and prepare such articles as will best accomplish such object, the Board invite the co-operation of all persons disposed to become private exhibitors, and will take charge of any articles coming within the conditions required by Her Majesty's Commissioners in charge of the London Exhibition, viz., every article produced or obtained by human industry, whether of raw materials, machinery, manufactures, or fine arts. All articles must be sent to Mr. George McLeod, Custom-house, the agent at St. John of the Board appointed to receive them, on or before the 15th January next, preparatory to being transmitted to London by the Provincial Government."

Mr. Stevens, the Secretary of the Provincial Board of Agriculture, seems to be indefatigable in his exertions to draw forth the latent energies of the Province, and to promote its best interests. He has been publishing several very valuable statistical documents and letters in the colonial papers. In one of these he observes:—

"It is to be hoped that Agricultural Societies will exert their influence in stimulating their members, to show what can be done in the way of agricultural production; that the mechanics will show that they are capable of executing work in their various departments, that will bear comparison with the workmanship of any country; while in the fine arts, we hope to convince the multitude that the finest specimens of the skill of any country can here be witnessed, executed by the artizans of our own Province, who too often toil in comparative obscurity.

"We consider the coming Exhibition as most timely, as there seems to be a tide of emigration setting towards our Province; but I cannot help feeling, with all that has been said and written upon the all-important subject of immigration, and notwithstanding all the liberal provisions made for the encouragement of some, that the all-important point has not been sufficiently attended to, or noted, viz.: the establishment of factories and such like works to give the emigrant ready employment, and retain him by means of such employment. We want the attention of capitalists drawn to the erection of cotton and woollen factories, to boot and shoe factories, and such like operations, and our fine streams applied to practical account in other ways than only in driving sawing machines.

"It will, perhaps, be an under-estimate to say that there are imported into our province, of boots and shoes alone, the value of seventy thousand pounds. Why is it that such a manufactory is not established on an extensive scale? By the returns before me, it appears that the value of boots and shoes used annually in our province is £89,000 and upwards; how many of these are manufactured in our own province?

"Of breadstuffs and grain there appears to be imported annually the enormous amount of £36,300; of meats, salted, cured and fresh, £69,000 and upwards. We might mention many other departments in which employment might be afforded to thousands, and whereby much of the wealth of our country might be retained."

A public meeting of artists, mechanics, and agriculturalists, was held in St. John at the close of June, at which a lively interest was manifested in the success of the Exhibition, and the following amongst other resolutions were passed:—

"That for aiding the prosperity of Agriculture, enlarging the inducements for immigration, and advancing the welfare of the Province in general, it is highly important to give every encouragement in our power to such home manufactures and mechanical productions as are suited to the wants, capabilities, and condition of this country."

"That farmers, and all who feel an interest in the agricultural welfare of this country, should employ their best efforts to make the Exhibition to be held at Sussex as creditable as possible."

"That it is greatly for the interest, and should be the aim of our mechanical operators, to furnish at the Provincial Exhibition, to be held in Sussex, in October next, productions of their best skill and workmanship."

"That for developing the resources and promoting the prosperity of this rich and flourishing province, and to bring its capabilities more prominently before the parent countries of Great Britain and Ireland, a vigorous and united effort should be made to furnish, and forward, to the Great Exhibition to be held in London in 1862, an extensive and well-chosen selection of the natural and artificial products of this country."

Passing now to the Pacific side of the continent we find that in Vancouver Island a large sum, for so small a colony, £1,000, has been officially voted towards the expenses, and subscriptions are also being collected. An Association has been formed for especially attending to the matter, an Executive Council appointed out of the General Committee, and four Sub-Committees of six gentlemen assigned for particular duties, industrial resources, minerals, Indian productions, and agriculture. The sum of £50 has been voted for the best Essay on the resources of Vancouver Island and British Columbia, and a small sum for printing it for distribution at the Exhibition. Circulars explanatory of the objects of the Association have been published and sent round the country.

The Executive Committee have drawn out an excellent list of articles, crude and manufactured, specimens of which they deem desirable for transmission to England, to represent the industrial resources of these colonies at the Great Industrial Exhibition in 1862. In their circular they direct public notice to one of the features of the Industrial Exhibition, viz., that of rewards for articles deemed worthy of special commendation for their goodness, their usefulness, for their ingenuity, for their commercial value, or as showing the adaptability of materials not previously known in supplying some common want.

Two methods of obtaining collections will be adopted:

1st. Specimens contributed to or purchased by the Association;

2nd. Specimens lent to the Association, of which due care will be taken, and which will be returned to the owner, or disposed of to the best advantage in England. All articles will be labelled with the name and address of the donor or lender, and will be conveyed to England in the same state as sent to the Association here, who will bear the expense of their transmission.

The Executive Committee trust to see specimens of our colonial produce, which, with care in their preparation, may enter into competition with similar articles of European or other colonial production, with a fair chance of winning, if not a *premium*, at all events that commendation from the gathering of all nations at the Great International Exhibition which would tend more than any other means to direct the attention of emigrants towards these colonies.

In reference to Canada, with which we have much in common here, Mr. Wallis, Head Master of the Government School of Art, Birmingham, and Deputy Commissioner of Juries in the Great Exhibition of 1851, speaking of the Exhibition of Art-industry in Paris in 1855, says:—"Probably the most complete display of colonial produce, properly so called, is that of Canada. Improving upon the experience of 1851, and satisfied that the exhibition of its products on that occasion had been of immense value to its commerce, the Colonial Legislature voted a large sum of money. * * The result is a most useful and even tasteful display of trans-atlantic utilities and products. Among the former may be quoted a deal window-frame, with sashes and Venetian shutters, manufactured by machinery, for sixteen shillings English, and a door frame, door and finishings of the same material, and manufactured in the same manner for about seventeen shillings. The workmanship is perfect in every respect. Such is the result of the application of machinery to the working of wood as practised in the United States and in Canada. The edge-tools also of Canadian manufacture took a higher position in the opinion of the Jury than those of England, and those stood relatively twice as high numerically as those of France. The woods of various kinds, many of them highly ornamental, and all useful, carefully cut into slabs and polished, form another useful feature in the Canadian department," &c.

The Executive Committee confidently anticipate that a large amount of public attention will be centered on the exhibition of the products of Vancouver Island and British Columbia, and they ask the zealous help of all towards worthily representing our native resources and aiding in the development of a land which in many ways is fitted to take a not unimportant part in the world's future history.

List of articles that may be contributed from Vancouver Islands and British Columbia:—

Agricultural.—Wheat, barley, oats, peas, beans, rye, hops, of these not less than one bushel of each. Roots, generally. Seeds (indigenous). Fruits. Wool. Preparations of any kind adapted for food, such as oatmeal, pearl barley, biscuit, &c. Island made beer or ale. Cheese, butter, &c. Native hemp, or flax, or any other product adapted for making textile fabrics.

Fish.—Salmon, codfish, herring, sardines, halibut, prawns, houlakans, oysters, or clams, dried, salted, pickled, or cured in any other way. Oil, procured from the whale, dogfish, houlakan, or fish of any kind.

Wood.—Spars for shipping or other purposes. Sections of native timber, plain, polished, or varnished. Plain and ornamental articles manufactured from native timber. Resins, pitch, &c.

Stone.—Slate, sandstone, granite, limestone, or marble, slabs of, or manufactured into useful or ornamental articles. Grindstones, whetstones, &c.

Minerals.—Gold, copper, silver, plumbago, coal. Salt, natural and prepared. Clays, adapted for potteries, bricks, &c., and articles made from the same. Manufactured articles of gold, silver, copper, &c., produced in these colonies. Articles of colonial manufacture, of foreign gold, silver, &c.; plumbago as pencils.

Fabrics.—Cured hides and skins—The same adapted for, or manufactured into, articles of daily use, such as harness, boots, shoes, &c.

Miscellaneous.—Specimens of horn of elk, deer, &c.—Articles manufactured of the same. Bark, for tanning purposes. Dyes. Medical preparations. Preparations of island fruits, such as cranberries, raspberries, currant, sallal, Oregon grapes, strawberries, native plum, &c. Preparations of island vegetables. Paintings, showing the use of any new pigment. Photographic pictures. Models of island vegetables, &c., in plaster or wood. Natural history specimens, such as birds, animals, insects, fish, plants, &c.

Articles Indicating Indian Handicraft, viz.—Manufactures of slate, wood, skins, hair, such as mats, &c., cedar-bark, such as hats, tippets, baskets, fishing-lines, ropes, &c., rushes, and grass.

His Excellency Governor Douglas, who is President of the Commission appointed here, took the chair at a public meeting held on the 12th February, at Victoria, which was numerously attended. In his address he stated that he had experienced much pleasure in acceding to the request to preside at a meeting summoned for so good an object as the proper representation of British Columbia and Vancouver Island at the Great Industrial Exhibition to be held in London in 1862. "Connected (he observed) as I have so long been with the direction of affairs in British Columbia and Vancouver Island, and having so large a stake in these countries, I cannot but feel a deep personal interest, apart from the official position which I

have the honour to occupy, in everything which tends to promote the success and progress of these colonies. Very little is known at home of the great extent and abundance of our natural resources, and that little known only to a few. I can conceive nothing which would so tend to bring these colonies face to face with the general public at home, and the world at large, as a proper representation of our natural products and industrial resources at the Great Industrial Exhibition of 1862. It will give me great satisfaction to do all in my power to further the objects of this meeting, which I so cordially appprove. With this view I have thought it expedient on public grounds, not only to sanction the use of offices and a place for storing the various collections that may be contributed for transmission home, but I am also disposed to sanction such pecuniary assistance in aid of private contributions as may be granted out of the public treasury, consistently with the existing state of the public finances. And I have reason to believe the House of Representatives is not indisposed to make such an appropriation."

A public meeting for the colony of British Columbia was subsequently held at New Westminster, on the 26th Feb. Governor Douglas presided, and Col. Moody, the Lieut.-Governor, occupied the vice-chair, when various resolutions were passed, and it was determined that the aid of the inhabitants of British Columbia, irrespective of nationality, be solicited, with an united effort to render justice to the merits of the Colony by creditably representing it at the Exhibition with samples and specimens of its numerous and varied resources. It was, however, the general feeling, that the collection and transmission of articles for representing Brtish Columbia should be made independent and irrespective of Vancouver Island.

A local exhibition is to be held before the articles are dispatched to England. Offers to take the contributions home freight free have been made and accepted.

FLAX AND ITS PRODUCTS IN IRELAND.

By Wm. Charley, J.P., Seymour-hill, near Belfast.

Appendix to Letter XVI.*

According to Mr. H. S. Tremenheere's report, the number of people employed in the Irish bleachmills is 4,183, of whom 1,100 are females, and 271 boys, leaving for adult males 2,812. Assuming that each adult male represents about 1,000 pieces of cloth being bleached annually, it would appear that about 2¾ millions of pieces are bleached each year, worth, probably, nearly £4,000,000.

A large quantity of low-priced linen is exported brown, as received from the looms; another class is slightly tinged yellow by steeping in dilute muriate of tin and catechu, and then finished or glazed by the beetling process already described. The former are technically called "rough browns," and are, I believe, used for blouses. The latter styled "hollands," much used for window blinds; but, in addition to yellow holland, we hear of "slate holland," "blay," "drab" and "black" ditto. I need scarcely say the first of these only resembles slate in colour, and this colour is attained by dyeing the cloth in the ordinary way.

I believe that drab colour is produced by using fustic, after what is called iron liquor, *i.e.*, acetate of iron. For black this acetate is used diluted, to stand five of Twaddel's Hydrometer; then dry the cloth, wash and plunge in a logwood bath. For slate colour, divi divi, or shellac, after the iron liquor.

Messrs. Wm. Kirk and Son, Keady, Armagh, are, without doubt, the largest finishers of these brown and coloured goods. The number of beetling engines they keep employed is very great, probably 180 to 200. The neighbourhood of Armagh is noted for this class of linens, and at the weekly markets held there large quantities of goods are sold to the finishers, who prepare them for the English and Foreign trade. Messrs. Kid, of Keady, Armagh, have been also largely engaged in this business, and there are several other large establishments about Ballymena, county Antrim.

The dyeing or printing of linens is, to use the words of Dr. Ure, "A chemical art;" a very important part of the process is the correct application of the mordants, or, as he explains, "the substances which are used, previously applied to piece goods, in order that they may afterwards take a required tinge or dye." Of course, if the mordants be universally applied over the whole cloth, and it afterwards is plunged into the dye, an even colour will result, while, if the mordant is only applied to portions of the cloth, an uneven colour or pattern will come out.

The latter operation is called printing; the former simply dyeing. The printing of cotton cloth or calico has been so well described by Dr. Ure and other eminent chemists, that I need not enter into any general account of this chemical art; it will be sufficient to confine my observations to the details that are specially remarkable in its application to the linen manufacture. So long as seventy or eighty years ago there existed in the north of Ireland a few petty printers, who operated on the home-made fabrics of the farmers, and produced, with no doubt the common indigo, an old fashioned pattern of blue ground with a white spot. This pattern was, I am told, a favourite style with the country girls, and was greatly in vogue in those days, before cheap calico dresses had been introduced. The printing of linens, however, was not an extensive business until very recently. During the last 20 years, from small beginnings, it has increased to an important branch. The printing of linens is not so cheap and expeditious an affair as that of cotton. At present the cost, namely 2d. to 3d. a yard, appears high in proportion to the value of the linens operated on; but as the trade extends, and larger quantities of each pattern can be ordered, this cost can gradually be reduced. The further causes of this increased expense, as compared with cotton, are various. Among the first there is the much greater cost of the preparatory bleaching; next, the greater difficulty of applying the madder dye, the flax fibre being harder and not so absorbent as the other; and, at the last, the increased cost of finishing with the beetles, or special patent machine, instead of the simple pressure through a calender.

Although printed linens cannot be sold at so low a figure by the yard as cotton, I question if in the end they would not be found cheaper. I am told that these linen dresses will wash up well over and over again, and retain the silvery brilliancy of the original colour, while it is generally found that the white ground in the cotton fabric soon loses its original purity, and assumes more or less of a yellow tinge. The flaxen fabric, also, if properly bleached, possesses much greater durability. Owing to this fact, it is the custom to use almost entirely *permanent* colours in printing linen, the article being too valuable to place on it the common *fugitive* colours from ordinary pigments put on low calicoes.

There is one advantage the linen fabric has over cotton that it is worth while to mention, for the information of the gentler sex, some of whom have lately met with such frightful accidents from their muslin dresses taking fire; the flax fabric is safe comparatively, being very slow to ignite.

Yet, with all these recommendations, it is singular to find that nearly all the linens printed in Ireland are for the foreign trade, scarcely a piece for home consumption. On the European Continent, in the United States of America, in Mexico and West Indies, these goods are greatly in favour.

On visiting premises where the printing of linens is carried on, we find in general connected therewith some bleaching machinery, as the linens have first to undergo that process. It is, however, a common practice for bleachers to whiten the goods and send them thus to the print works ready for immediate use.

There are two ways of impressing the pattern on the

* See Vol. VIII., p. 407.

goods—the one by blocks of wood applied with the hand, called block printing, the other by copper rollers. The pattern, after first being sketched on paper, is transferred to the smooth surface of these wooden blocks, which, to ensure permanent evenness, are made of four pieces of wood glued together, curiously arranged so as to prevent the casting or crookedness that would occur if in one solid block. On the reverse side of the block are sunk places for the workmen to lift it by.

The pattern being nicely developed on the smooth face, the next point is to arrange it for the stamping process. A few stamps are still made by cutting away the wood and having the pattern somewhat like common printing type, but the improved plan is to work up the pattern in copper.

This operation requires great skill of hand and a nice eye. Copper wire beaten out flat is set in to represent lines, and small pins of copper are driven in to bring out the minute portions.

I need scarcely say that it requires men of considerable taste and education to originate new patterns. The Government Schools of Design were here of considerable service. What a pity such useful institutions should not have received more permanent consideration and support.

The block will be probably nine inches square, and when ready for use the next thing is to prepare and apply the mordant. This is done by mixing it up with starch or gum, to give consistency, and it is then stamped by hand on the white linen, on a table covered with a soft material. This hand process is necessarily rather slow, and only one colour is put on at once, but it suits best in many cases. The mordants vary according to the colour. Those most in use are the ordinary iron liquor, alumina, and indigo.

After the pattern is impressed, the goods are taken to a dry room, called the "ageing room," and are retained there from two to five days, to ripen or set the mordant; black and chocolate requiring double the time of the reds and pinks. From this room the goods descend to a lower one containing vats, filled with a curious compound, the odour of which reminds the visitor very strongly of the farm yard; in fact, it is a weak solution of cow manure, which, it appears, has not been equalled as yet in its peculiar office by any chemical productions. After passing through these vats over rollers, the cloth is well washed, and the gum or starch of the mordant is then quite extracted. The cloth is then ready for the madder dye bath, where it is detained about 2¼ hours, revolving on rollers. It is next washed by machinery, then twice soaped and washed again; plunged in a weak bath of chloride of sodium, washed, starched, and finished, either by beetles or by a patent process, same as bleached linens.

The printing by rollers is of course more rapid than by hand blocks, but does not suit all styles. The pattern is cut out of the copper roller like a seal, directly opposite in principle to the block-cutting which stands up like type; the cloth is passed through the mordaunt stuff and over the rollers, thence to hot cylinders for drying; the rest of the process is the same as just described for block-printing.

Four colours can be put on at once on these machines, each colour requiring simply a separate roller; as many as twelve colours could be put on if required, so that by this system the saving of time is very considerable. Printing in one uniform colour is called padding.

The principal works for printing, near Belfast, are at Clonard and Old-park, and as both establishments have been made gradually more extensive of late, it is fair to presume that the demand for printed linens is on the increase. Some Belfast merchants send goods across to Glasgow, but the local advantages of the Irish companies will probably secure this portion of the trade eventually. I feel greatly indebted to Mr. Fulton, the managing director of the Clonard print works, for the information he gave me on my visit to that place, and for the trouble he took in explaining the rather intricate and peculiar details of this chemical art.

Last autumn Parliament was induced by Mr. Roebuck, to pass an act for regulating labour in bleach-mills, but an exception was made in favour of the open air process, so that linen bleach greens are very properly free from useless harassing regulations and humiliating inspection.

ITALIAN EXHIBITION, 1861.

The government of the King of Italy has resolved to hold an Exhibition of Art and Industry at Florence in the ensuing months of September and October. Italy will see for the first time the works of her artists and the products of her industry collected together under the roof of a Crystal Palace. An official announcement has been circulated which specifies the following as the principal features of the exhibition:—

It will be divided into three departments, agricultural, industrial, and artistic. It is intended that Rome and Venice shall both be represented. It is calculated that there will be about 5,000 contributors. In the artistic department the works of artists deceased during the last twenty years will be exhibited, as well as those of living artists. The cattle show will comprise not only the products of the Peninsula but also those of Sardinia and Sicily.

Two thousand workmen are now engaged upon that part of the Palace of Industry which is to hold the works of painters and sculptors. In the machinery department will be exhibited the Poltelegrafo Coselli, acting between Florence and Leghorn; also a new motive power discovered by Signors Barsanti and Matteucci, destined perhaps in time to change the present system of locomotion.

In the horticultural department the Victoria Regia in flower, some noble palm trees, and a fine collection of orchideæ are to be exhibited.

The cousin of his Majesty, Prince Carignano, has accepted the Presidency of the Royal Commission for the Exhibition, assisted by the Marquis Ridolfi as acting president, and Professor Careza as secretary. His Majesty the King of Italy will open the Exhibition in person. At the same time a meeting of the Italian savans will be held, which has not taken place for fifteen years. The French naturalists who assemble at Schonberg, as well as the Swiss, are invited to meet their colleagues at Florence.

For those who are fond of sport, the races, and the opening of the Tiro Nazionale for rifle shooting, will take place.

Manufacturers of agricultural implements, both English and others, are specially invited by the Royal Commission to send in specimens of their manufacture. Not only will a place be reserved for the reception and exhibition, but sales will be permitted. A new market is thus thrown open to a branch of industry in which the United Kingdom particularly excels.

INTERNATIONAL EXHIBITIONS.

The Paris correspondent of the *Daily Telegraph*, writes:—

"Some enterprising individuals have started the idea of carrying out the principle of exhibitions to what is called its completion. France commenced periodical industrial expositions at the end of the last century; England made them universal ten years ago. The time is now arrived, say the projectors, to render the latter permanent; and it is said that a company is actually in course of formation to establish a continuous exhibition of the productions of all nations in this city. The idea is not new, but the notion of individual enterprise attempting such an undertaking in France is admitted to be surprising. The project seems to be seriously entertained, and more information is promised soon."

COTTON IN EGYPT.

The *Times* correspondent at Alexandria says:—"Dr. Forbes and Mr. Haywood, the Secretary of the Cotton Supply Association, arrived here by last mail, and in the

course of the next day or two will probably have an interview with the Viceroy.

"There is no doubt that the production of cotton in this country might be very greatly increased, though I do not think that there is any chance of attaining the object by a displacement of other crops. If it were desired to introduce something entirely new, there would no doubt be a large amount of obstinate prejudice to overcome, but it would be a mistake to imagine that the Fellahs do not possess a lively appreciation of the respective profits and advantages they derive from the various crops they are in the habit of growing. If the balance were in favour of cotton, it would require no pressure whatever from without to stimulate its culture in preference to grain, pulse, or other articles. I apprehend it will be found that the production of Egyptian cotton can be increased to any material extent by only two means—the one by introducing the growth of short stapled cottons, whereby a heavier crop would be gathered off the same breadth of land; and the other by bringing fresh lands into cultivation. The first is, of course, a mere question of profit and loss, upon which, as yet, opinions are greatly divided, and which can only be settled by actual experiment. A fair trial must, however, before long be made, and herein the Viceroy, as well as some of the large landed proprietors of his family, may be able to give some useful assistance.

"With regard to an extension of cultivation, the obstacles arise chiefly from the scarcity of hands and of capital. The want of labour might be partially remedied by the introduction of improved machinery, especially for separating the cotton from the seed. The M'Carthy gin has already been, to some small extent, brought into use upon the estates of the large landholders, and with a considerable degree of success; but, whether it be owing to mere prejudice or to some more substantial reason, it is found that the greater number of the Manchester spinners object to it, and although there are a few who actually give it the preference over cotton cleaned by the old method, upon the whole the produce of the M'Carthy gin has to be disposed of at lower prices, and is, moreover, of much slower sale.

"With regard to the want of capital, the difficulty might be met by offering advances to the villagers on fair terms. A system for supplying money to the fellahs already exists, though to an insufficient extent. The business is chiefly carried on by Greek and Levantine traders; but owing perhaps partly to the great difficulty that is often experienced in obtaining reimbursements, either in money or in goods, the advances are made at such exorbitant rates that even 3 or 4 per cent. per month is considered moderate.

"In this matter, should it be deemed proper to enter into arrangements for the purpose, the Government might possibly render some useful assistance by enforcing and, to some extent, superintending the observance of the contract that might be entered into by the villagers; but I believe that any such undertaking would be altogether foreign to the views of the Cotton Supply Association, and it must be confessed that it would probably be found difficult to carry it on under any system not open to objection."

NATURAL PRODUCTS OF SIAM.

Sir Robert H. Schomburgk, British Consul-General of Siam, contributes to the *Technologist* a report on the vegetable products of that country. Owing to the vast extent of Siam and its geographical situation, lying under the tropics and favoured by periodical rains, these are very numerous. Rice, sugar, and pepper are, however, the staple articles; the first serving not only for home consumption, but a large quantity is exported to China. Several varieties of rice are raised; some account as many as forty, but four species are principally cultivated, namely, the common rice, of a white colour, much resembling the rice of Carolina; the mountain rice; the glutinous, and the red rice. The first kind is mostly exported. Rice, the principal export, of which in 1858 not less than 100,000 tons were exported, principally to China, is grown over the whole plain of Siam. Nakhon-Yaisi and Petrio are the principal sugar districts; but it is also produced at Paklat, Bangpasoi, Chantibon, and Petchaburi, in considerable quantities. The owners of the mills seldom cultivate the canes themselves, but purchase it standing in the fields from the growers, who have usually money advanced to them by the mill-owners at the commencement of the season, to enable them to plant on their ground; they in return being bound to sell all their cane at a fixed price to the person lending the money, besides paying interest at the usual rate. The cultivation of the sugar-cane has greatly increased. It is mostly in the hands of the Chinese. The extraction of the juice of the cane and its manufacture into sugar are carried on in a very primitive manner, without any of the modern improvements to obtain from the cane the largest possible quantity of a superior quality of sugar. Large forests of teak exist on the Burmese boundaries. The logs, when dry enough to float, are made into rafts and floated down the rivers to Bangkok, where they are usually sawn. The most suitable form for exportation is planks five inches in thickness. The supply has almost entirely ceased, owing to the high prices and scarceness of wood. The tree is now fully 50 per cent. higher than it was in former years. A number of woods, the produce of the forests in the interior of Siam, might become of importance, were their qualities for naval or civil architecture, or as woods proper for ornamental purposes, sufficiently known. Amongst others the Takieng, which, as far as regards size and quality, might become a rival to the teakwood, possessing, moreover, the great advantage that it may be easily bent by artificial means. Trees belonging to the pine genus are not uncommon, principally on the eastern coast of the Gulf of Siam, which might furnish liquid bitumen for the preparation of pitch or tar. Amongst dyewoods, the principal is the sapan (*Cæsalpinia sappan*), of which large quantities are exported. It is the spontaneous produce of the forests of the northern provinces of Siam and the frontier hills dividing that country from Tenasserim. There are enormous forests of this wood in the upper parts of the country and down the west coast of the Gulf of Siam. The greater part of the supplies brought to Bangkok comes from Soupan and Bang Chang, also from the west coast of the Gulf. A beautiful dye of a brilliant yellow is procured from the heart of the jack-tree (*Artocarpus integrifolia*). This wood deserves a closer examination whether it might not become of importance to commerce, not only as a dye, but likewise to the cabinet maker. The natives obtain a fine red dye from the roots of the *Morinda citrifolia.* The wood of a species of mangrove yields a red colour, and the bark of the common kind (*Rhizophora Mangle*) is used in tanning, and a small quantity of it is exported. Several species of plants furnishing indigo grow spontaneously in the interior. An attempt has recently been made by a British subject to manufacture the dye from these plants, but he has not succeeded in rendering it profitable, in consequence of which he has given up the speculation. Wood oils, which more properly ought to be called resinous balsams, are yielded by *Dipterocarpus trinervis* and allied species. They give to teakwood a fine polish, and are substituted in house decorations for the coloured paints for verandahs, window-sashes, doors, &c. The balsamic resins, which are yielded by numerous trees of the forests of Siam, are spoken of as deserving much more attention than they have hitherto received. Amongst the fibres of plants growing in Siam useful for textile fabrics, a species of hemp has been exported which is said to be prepared from a plant resembling a nettle in appearance. This has probably been obtained from the *Urtica tenacissima,* the fibres of which have been pronounced identical with the celebrated China grass. The real hemp is likewise cultivated, not so much for its fibres, as for extracting its intoxicating and narcotic qualities, for the preparation of the haschisch

of the Arabs or guncha of the Siamese, which is used for the same purpose as opium, producing, when being smoked, exhilarating effects, with subsequent prostration and sleep. The cultivation of cotton has not received that attention which it deserves. Small quantities are produced in the Laos country, samples of which Sir R. Schomburgk has transmitted to her Majesty's government. The great distance of the country where it is at present cultivated, and the difficulty of transport to Bangkok from the interior, have no doubt injuriously operated in preventing the development of the trade. He says, "Judging from the countries that produce cotton which I have visited—namely, the United States, the West Indies, and Guiana—I see no reason why the alluvial districts of Siam should not produce as fine a cotton as the countries previously stated. A want is seriously felt to effect an extensive cultivation—namely, the scarcity of labourers. The distance of the country where cotton is cultivated from Bangkok is very great; and as the article is so bulky for transport in canoes down the river, this is one of the circumstances which has operated against a greater development of this trade. To obviate this difficulty in some degree, her Majesty's government has included amongst the presents forwarded to the sovereigns of Siam a hydraulic press, to compress the cotton into bales."

IMPLEMENTS OF WAR.

The annual meeting of the members of the Institution of Mechanical Engineers was opened at Sheffield on Wednesday, the 31st ult.

Sir Wm. Armstrong, President, delivered an address. After sketching the history of steam inventions, he said:—In thus glancing at the history of mechanical science during the last eighty years, we see how entirely our successes have been based upon the possession of that metal (iron) which the Author of nature has supplied us with in the greatest abundance. I have hitherto spoken only of the mechanical arts as applied to the purposes of peace, but I have yet to refer to the darker side of the picture in speaking of their application to the purposes of war. Our warlike neighbours, the French, always forward in everything appertaining to war, have of late years devoted their energies to two most important subjects—the rifling of ordnance and the application of defensive armour to ships. Their advances have necessitated similar steps on our part, and we have certainly no reason to suppose that we are behind them in the race. With the first of these subjects I have been personally much concerned, and I have also had opportunities of observing the merits and defects of the various kinds of armour plates with which experiments have been made by the direction of her Majesty's government. I need scarcely say that up to the present time, cast iron has been almost exclusively employed in the construction of heavy ordnance; but guns made of that material have not been found adequate to resist the more severe strain incident to the use of elongated rifled projectiles. This inadequacy of strength becomes the more decided as we increase the magnitude of the gun, and since a growing demand exists for more powerful artillery, the use of cast iron for its construction seems to be entirely precluded. It is said, and I believe with truth, that in America the manufacture of cast iron ordnance has been so far improved by applying water to cool the casting from the interior as to enable serviceable guns of this material to be produced of much larger bore than have been made in England. But it appears that these guns have not been rifled, and are only intended to be used with hollow projectiles. This success, therefore, affords no reason for coming to a different conclusion as to the unfitness of cast iron for the construction of rifled guns designed to project solid shot, especially when the dimensions are large. Even when strengthened by wrought iron hoops, the tendency of cast iron in a gun is to become weaker by every succeeding discharge. This is owing to minute fractures occurring in the bore, generally in the vicinity of the vent, and gradually extending until they terminate in the rupture of the gun. If, therefore, cast iron guns are to be utilized at all as rifled ordnance, it can only be by confining their use to hollow projectiles and light charges; but, if the same indulgence were extended to wrought iron guns, equal efficiency would be obtained with half the weight of metal, and on this ground alone the superiority of the latter is decisive. After stating the difficulties with regard to wrought iron, Sir W. Armstrong said—It will be a great era in metallurgy when a material possessing the toughness and ductility of wrought iron, combined with the homogeneous character of a cast metal, can be economically supplied in large blocks. But whatever the march of improvement may effect, I doubt whether such blocks can yet be produced at a cost which would admit of their extensive application. I am glad, however, to see that papers are to be read at this meeting which may be expected to bear upon this important subject. With regard to the great question of the ultimate effect of artillery against ships protected by defensive armour, I believe that whatever thickness of iron may be adopted, guns will be constructed capable of destroying it. At the same time I am of opinion that iron-plated ships will be infinitely more secure against artillery than timber ships. The former will effectively resist every species of explosive or incendiary projectile, as well as solid shot from all but the heaviest guns, which can never be used in large numbers against them. In short, it appears to me to be a question between plated ships or none at all, at any rate so far as line-of-battle ships are concerned. With respect to the quality of the material best adapted to resist the impact of shot, this subject is engaging much attention in the town of Sheffield and the iron districts generally. So far as my observation and experience go, I may say that hardness and lamination are the conditions most essential to avoid. In striking a plate the tendency of the shot is to fracture rather than to pierce the material. When penetration is effected, the hole is of a broken character, and not such as would be made by the cutting action of a punch. The softer, therefore, the iron, the less injury it will sustain, and I apprehend that steel, in every form, will, from its greater hardness, be found less effective than wrought iron, while its cost would be very much greater. As regards lamination, it has been clearly ascertained that a given thickness of iron, made up of successive layers of thin plates, is very much weaker for the purpose of armour than the same thickness in the solid form. But a laminated plate, by which I mean a plate having the layers composing it imperfectly united, must be regarded as an aggregation of separate plates, so that the strength derived from continuity is wanting. If this tendency to lamination could be obviated, rolled plates would, in my opinion, be preferable to forged, since the iron would acquire a more fibrous condition, but the existence of this liability appears to turn the scale in favour of forging. I hope the time is far distant when these great questions concerning attack and defence may receive a practical elucidation in actual warfare; but I trust that in the course of our efforts to solve them, discoveries may be made which will be as useful for the purposes of peace as for those of war.

Proceedings of Institutions.

Ebbw Vale Literary and Scientific Institution.—The report for the past year states that with but one exception, a marked falling off may be observed in all the departments connected with the Society. The number of subscribers, which at the end of June, 1859, amounted to 223, and at the end of June, 1860, to 205, has this year diminished to 188, showing a diminution in two years of 35, or nearly 20 per cent. Those who have paid during the various quarters of the last year are:—First quarter, 209; second quarter, 218; third quarter, 206; fourth quarter, 183. The depressed state of the trade in the

neighbourhood, and the constant changes which necessarily occur amongst the residents of such districts as this, may account in a measure for some retrograde movement occasionally; but the committee cannot but feel that to the absence of energy, or of a due appreciation of the advantages accruing to members, must be attributed the want of success which they have this year to record. The important subject of classes for mutual improvement and instruction has totally failed, and it is remarkable that amongst a population numbering nearly 10,000, the advantages of such means of advancement are not recognised. In common with many Institutions the finances have suffered by the delivery of lectures. Those of a literary and scientific character have invariably been attended by a loss, but this year the sub-committee appointed to superintend this department, observing the ill-success which has accompanied their endeavours, have only ventured upon a few, and those of a light and entertaining nature. By these a deficit of £7 7s. 2d. has been sustained, and the committee consider that perhaps a wise discretion has been exercised by refraining from involving the Institution in further loss. The annual *soirée*, which took place at the commencement of the year, was of a highly pleasing and instructive character, and appeared to give much satisfaction to those who attended it. Financially, however, this was a failure, and the funds suffered to the amount of £6 2s. 6d. In consequence of the distance from any town, the committee have been often seriously inconvenienced by not being able to procure a good instrument on the occasion of a musical entertainment. An opportunity, however, offered itself this year for the purchase of an excellent pianoforte, and two amateur concerts were given towards defraying the expenses of its purchase, a sum of £28 5s. 2d. being thus realised. The remaining £34 15s. 10d. has been kindly lent without interest; and the committee congratulate the members on possessing an instrument of their own, whereby the expense and risk of hiring are avoided; and an opportunity for practice is daily afforded them during one hour in the day, viz., from 3 to 4 p.m., an hour when the rooms are less frequented; and they hope that this new source of rational amusement which has been opened will have the effect of attracting new members. The hon. librarian reports that, notwithstanding the falling off in the number of subscribers, the issue of books has increased from 2,497 to 2,646. The classification is as follows:—History, English 120, Welsh 24; Biography, English 158, Welsh 23; Voyages and Travels, English 156, Welsh 10; Science and Philosophy, English 120, Welsh 15; Tales and Novels, English 851, Welsh 10; General Literature, English 703, Welsh 111; Religious Literature, English 102, Welsh 64; Poetry, English 68, Welsh 111; total, English 2,278, Welsh 368. 40 volumes have been rebound, and two volumes repaired —35 books (bound periodicals) have been added to the library, making a list of 1,382, of which 1,224 are English, and the remaining 158 Welsh. The museum has received a few additions during the year, and has not been attended by any outlay. An abstract of the accounts of the society shows that the expenditure has been £95 16s. 5d., and that there is a balance due to the treasurer of £22 14s. 8d.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Num.

Delivered on 18th July, 1861.

431. Postal Revenue (Ireland)—Return.
440. New Law Courts—Copy of Treasury Minute.
251. Bills—Metropolitan Building Act Amendment.
252. Bills—Public Works (Ireland).
253. Bills—Crown Suits Limitation (amended).
Affairs of Syria—Correspondence (Part 2).
Public General Acts—Caps. 28, 29, 30, 31, 32, 33 and 34.

Delivered on 19th July, 1861.

427. Naval Medical Supplemental Fund Society—Return.
429. Municipal Boroughs (Ireland)—Paper.
432. Chamber of London—Annual Accounts.
441. Courts of Justice Building Act (Money) Bill—Minutes of Evidence.
254. Bills—Episcopal and Capitular Estates Act Continuance, &c.
255. Bills—Gunpowder, &c. Act Amendment.
Census of Ireland for 1861—Enumeration Abstracts.
Colonial Possessions (Part I., West Indies and Mauritius—Reports.

Delivered on 20th and 22nd July, 1861.

422. Jersey—Papers.
436. Enfield Factory—Return.
437. Gentlemen-at-Arms and Yeomen of the Guard—Return.
444. Public Institutions—Return.
441. Courts of Justice Building Act (Money) Bill—Minutes of Proceedings of the Committee.
332 (2). Poor Removal (Rebecca Kearney)—Further Return.
428. Police Grant—Return.
433. Salmon and Trout Fisheries Bill—Minutes of Proceedings of the Committee.
443. Superior Courts of Law (Fee Fund)—Paper.
449. China War (Vote of Credit)—Estimate.
425. Births, Deaths, and Marriages (Ireland) Bill, &c.—Report from the Committee.
256. Bill—Public Houses (Scotland) Acts Amendment (as amended by the Select Committee).

Delivered on 23rd July, 1861.

404. Outrages (Kilmacrenan)—Return.
410. Education (Dissenters' Schools)—Paper.
448. Public Accounts—Fourth Report from Committee.
450. Navy (Iron Ships, &c.)—Supplementary Estimate.

Delivered on 24th July, 1861.

439. Chatham Dockyard Extension—Report from Committee.
453. Civil Services—Supplementary Estimate, Class 1, Vote 9.
454. Civil Services—Supplementary Estimate, Class 4, Vote 15.
257. Bills—Newspapers, &c.
258. Bills—Public Offices Site.
259. Bills—Revenue Departments Accounts.
260. Bills—Lunatics (Scotland).
261. Bills—Treasury Chest Fund.

Delivered on 25th July, 1861.

203. County Treasurers—Abstract of Accounts.
435. Militia Volunteers—Return.
447. Education (Ireland)—Annual Report of the Commissioners.
457. Supply, &c.—Return.
461. Militia Estimates—Report from Committee.
462. Army—Supplemental Estimate (Volunteer Corps).
463 Royal Atlantic Steam Navigation Company—Report from Committee.
262. Bills—Inland Revenue (amended).
263. Bills—Stamp Duties on Probates, &c. (amended).
Turkey—Treaty of Commerce and Navigation.

Delivered on 26th July, 1861.

434. Small Debt Courts (Scotland)—Return.
465. Post-office (Isle of Man)—Returns.

Delivered on 27th July, 1861.

265 (1). East India (Moral and Material Progress and Condition)—Paper, Part 2.
442. Criminal Prosecutions, &c.—Return.
265. Bills—Corrupt Practices Prevention Act (1854) Continuance.
266. Bills—Metropolitan Police Receiver.

Dated 29th July, 1861.

38 (6). Trade and Navigation Accounts (30th June, 1861).
393. Police (Scotland)—Paper.
460. Education of Destitute Children—Report from Committee.
267. Bills—East India Loan (No. 2).
269. Bills—Parochial Offices.
270. Bills—Local Government Supplemental (No. 2).

Delivered on 30th July, 1861.

455. Metropolitan District—Returns.
458. Aberavon Borough—Return.
469. Post-offices (Londonderry, &c.)—Return.
258. Bill—Militia Ballots Suspension.
Public General Acts—Caps. 35, 36, 37, 38, 39, 40, 41, 42, 43, and 44

Session, 1860.

383 (C 2). Poor Rates and Pauperism—Return (C).

Delivered on 31st July, 1861.

446. Registry of Deeds Office (Dublin)—Return.
451. Plumstead Cemetery—Return.
473. Foreign Wine—Account.
482. Dockyard Accounts—Return.
483. St. Paul's Cathedral, London—Return.
271. Bill—Volunteers, Tolls Exemption (No. 3).

Delivered on 1st August, 1861.

452. East India (China War)—Account.
472. Fines and Penalties (Ireland)—Abstract of Accounts.
481. Fortifications—Account.
326. Finance Accounts—Classes 1 to 8.
463. Royal Atlantic Steam Navigation Company—Report, and Minutes of Evidence.
272. Bills—Probates and Letters of Administration Act (Ireland) Amendment.
273. Bills—Grand Juries, &c. (Ireland) (amended).
Census of Scotland, 1861—Tables.

Delivered on 2nd August, 1861.
Tariffs—Supplemental Return for France.

Delivered on 3rd and 5th August, 1861.
474. Poor Relief (England)—Third Report from Committee.
480. Coinage—Accounts.
488. National Schools (Ireland)—Return.
497. Accrington (Easter Dues)—Return.
501. War-office—Return.
513. Lighthouses Abroad—Account.
324 (A II.) Poor-rates and Pauperism—Return (A).
487. Treasure Trove (Return).
498. Registry of Deeds Office (Dublin)—Returns.
500. Redundant List (Public Departments)—Return.
476. Metropolis Local Taxation—Third Report from Committee.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, August 2nd*, 1861.]

Dated 24th July, 1861.
1859. R. Threlfall, Bolton—Imp. in machinery or apparatus for spinning cotton or other fibrous material.
1861. J. Platt and W. Richardson, Oldham—Imp. in machinery or apparatus commonly called "gins," for cleaning cotton from seeds.
1863. W. Longmaid, Inver Galway, Ireland—Imp. in the manufacture of iron.

[*From Gazette, August 9th*, 1861.]

Dated 6th June, 1861.
1434. S. C. Lister and J. Warburton, Bradford—Imp. in treating spinning and doubling yarns.

Dated 25th June, 1861.
1628. J. Fowler, jun., Leeds—Imp. in machines for ploughing or tilling land by steam power.

Dated 27th June, 1861.
1646. J. C. Smart and A. Aitchison, Scarborough—Imp. in the manufacture of charcoal.

Dated 29th June, 1861.
1664. W. Clark, 53, Chancery-lane—A new locomotive apparatus having a movement resembling walking. (A com.)

Dated 3rd July, 1861.
1684. H. B. Barlow, Manchester—Certain imp. in machinery for spinning. (A com.)

Dated 6th July, 1861.
1720. H. Schutt, Bradford—Imp. in spinning frames for spinning wool, cotton, silk, or flax, and other fibrous material. (A com.)

Dated 9th July, 1861.
1736. G. S. Parkinson, 10, Lambton-terrace, Kensington—Imp. in perforated materials in combination with india-rubber.

Dated 11th July, 1861.
1760. O. J. T. Gossell, Moorgate-street—An improved combined locomotive engine and carriage. (A com.)

Dated 17th July, 1861.
1794. A. W. Harnett, 97, Guildford-street, Russell square—Imp. in the construction of steam engines, air engines, and pumps.

Dated 20th July, 1861.
1828. M. Gilbert, Manchester—Certain imp. in boots and shoes or other coverings for the feet.
1830. R. Thatcher, Oldham—Imp. in lubricators for lubricating the various parts of machinery.

Dated 22nd July, 1861.
1838. J. B. Wood, Broughton, near Manchester—Imp. in the manufacture of shuttle pickers.

Dated 23rd July, 1861.
1844. T. Gray, 19, Hill's-cottages, Union-road, Wandsworth—An improved mode of preparing flax from old materials for spinning and other purposes.
1848. F. Hirschfeld, 24, Cannon-street West—Imp. in ornamenting or decorating articles of iron. (A com.)

Dated 24th July, 1861.
1850. F. Hirschfeld, 24, Cannon-street West—Imp. in locks and keys. (A com.)
1852. F. Mills, Heywood, near Manchester—Certain imp. in machinery for carding cotton and other fibrous materials.
1856. W. E. Gedge, 11, Wellington-street, Strand—Imp. in the preparation and clarification of the saccharine matters obtained from beet-root, sugar cane, Indian millet, and other sacchariferous vegetables or plants. (A com.)
1858. A. Wood, Lewes—Imp. in apparatus employed for fermenting purposes in brewing beer, as also for storing beer and for general purposes of fermentation.
1860. A. J. D. Seitz, Newcastle-upon-Tyne—Imp. in the drying of bricks and other articles manufactured of fire-clay or common clay, and in the construction of drying rooms for such purpose.
1862. H. Cook, Manchester—Improved apparatus for punching or marking the pattern cards used in weaving figured fabrics.

Dated 25th July, 1861.
1866. M. Klotz, 29, Boulevart St. Martin, Paris—A new application of certain products to ornamenting tissues, papers, and other surfaces.
1868. R. Kelly, Wilden, near Stourport, and J. Shakespeare, Dudley—New or improved machinery to be used in the manufacture of tin plates and terne plates, and iron plates coated with lead.
1870. J. Simmons, Wellington-lane, Battersea—Imp. in the construction of buildings to enable them to withstand the action of fire.

Dated 26th July, 1861.
1874. F. Johnson and B. Hockin, North-street, Smith's-square, Westminster—Imp. in securing or fastening nuts for railway fish plates and for other purposes.

Dated 27th July, 1861.
1878. W. E. Gedge, 11, Wellington-street, Strand—An improved weighing machine. (A com.)
1880. R. E. Garrood, High-street, Chelmsford—Imp. in mitre boxes and shooting boards.
1882. W. H. Harfield, 2, Royal Exchange-buildings—Imp. in constructing and propelling ships and vessels.
1884. C. E. Amos, The Grove, Southwark, and J. Francis, Penrhynn Slate Quarries, near Bangor—Improved machinery for dressing slates.

Dated 29th July, 1861.
1890. R. Riley, Hull—Imp. in fusee signals, and in means or apparatus for applying or placing them and fog signals on the rails of railways from the van of a train in motion.
1892. C. C. J. Guffroy, Lille, France—Imp. in preparing medicinal substances and compounds from the livers of cod and other salt water fish.
1894. E. H. Johnson, St. Mary's Cray, Kent—Improved machinery or apparatus for disintegrating, crushing, or drawing out vegetable fibres.

Dated 30th July, 1861.
1896. T. Saunderson, 76, Princes-street, Dalston-road, Kingsland—A pasteboard, millboard, and cardboard medal for advertising purposes in lieu of handbills.
1898. W. H. Ash, London, Canada West—Imp. in reaping and mowing machines. (A com.)
1902. J. M. Hart, 76, Cheapside—Imp. in the arrangement or construction of parts of locks or fastenings.

Dated 31st July, 1861.
1904. H. J. Holland, Bond-street, and W. Payton, Johnson-place, Harrow-road—Imp. in breech-loading fire arms.

PATENTS SEALED.

[*From Gazette, August 9th*, 1861.]

August 9th.
346. N. Thompson.
351. W. Oldfield.
354. J. Bowron.
356. W. Corbett.
357. C. Prater.
358. W. Maltby.
360. W. Brown.
365. C. S. Roskilly.
368. T. T. Lawden and T. Jones.
370. J. S. Blake, G. C. Lingham, and J. Nicklin.
372. W. Roberts.
373. J. Poole, J. Wright, F. S. Hemming, & G. Searby.
374. A. Ripley and W. H. Stevenson.
378. E. Rimmel.
379. J. Garforth.
380. H. D. P. Cunningham.
383. M. A. Prenslan.
384. G. J. W. C. T. Bradbury and J. Lawton.
386. A. Lecat.
387. A. Senior.
388. M. B. Westhead.
391. E. H. Barré and C. J Blondel.
392. J. Horn.
395. N. Nussey.
400. E. F. Barnes.
449. J. Reeves.
559. G. H. Birkbeck.
572. G. Eskholme.
1033. P. C. Lefol.
1034. C. Callebaut.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, August 9th*, 1861.]

August 5th.
1794. S. Carey.
1804. J. Walker.
1816. W. Spence.
1868. L. A. Herrmann and E. I. E. Herrmann.

[*From Gazette, August 13th*, 1861.]

August 8th.
1809. T. Ingram.
1836. G. Metzler and J. Waddell.

August 10th.
1839. A. J. Paterson.
1847. F. J. Manceaux.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, August 9th*, 1861.]

August 6th.
1725. G. A. Cox.

August 7th.
1735. H. Turner.
1775. J. and C. M. Greaves.

[*From Gazette, August 13th*, 1861.]

August 9th.
1812. P. A Le Comte de Fontainemoreau.
1947. J. Westwood and R. Baillie.

August 10th.
1766. J. Petrie, jun.

Journal of the Society of Arts.

FRIDAY, AUGUST 23, 1861.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £426,500, have been attached to the Deed.

The following arrangements, in addition to those already published, have been made in foreign countries and the Colonies:—

Kingdom of the Netherlands.

The following are the Commissioners—Mr. J. W. L. Van Vordt, of Rotterdam, *President;* Dr. E. H. Van Baumhauer, of Amsterdam; Mr. J. A. Van Eyk, of Amsterdam; Mr. J. Groll, of Haarlem; Mr. M. L. Hermans, of the Hague; the Hon. H. G. C. L. Janssens, of the Hague; Mr. W. Poolman, of Gouda; Mr. C. Rochussen, of Amsterdam; Mr. L. Royer, of Amsterdam; Dr. S. Sarphati, of Amsterdam; and Mr. W. C. A. Staring, of the Hague.

Tunis.

The Bey of Tunis is about to appoint a Commission.

Hamburg.

On the proposal of the Senate of Hamburg the Bürgerschaft has voted the sum of 20,000 marks currency for the necessary expenses to be incurred in the representation of the produce and manufactures of the City at the Exhibition, and a committee has been appointed, the chairman of which is Mr. Senator Alfred Rücker, late Hanseatic Minister in London.

Greece.

The following are the Commissioners:—

Messrs. N. Théocharis, *Chairman*, Constantine Dosios, G. Nautis, M.P., X. Lauderer, Th. Ophanides, P. Gionnopoulos, S. Spilistakis, D. Aeniau, N. Balsamaki, S. Krenos, Lucas Rhalli, S. Melas C. Douronti, and John Ghinakos.

Frankfort.

A Commission has been appointed of which Senator Berners is the *President*, and constituted authority for communication with Her Majesty's Commissioners.

South Australia.

The following gentlemen form the several Committees in the colony for the purpose of collecting and forwarding articles of Industry and Art to the Exhibition:—

Central Committee.—The very Rev. Dean Pownall, *Chairman:* the Lord Bishop of Perth; Messrs. the Hon. F. B. Barlee, Archibald Paull Burt, the Hon. Alfred Hillman, Henry Wakeford, George Clifton, Lionel Samson, William Locke Brockman, Robert King, George Shenton, J. G. C. Carr, Francis Lochée, E. Newman, L. S. Leake, S. A. Barker, and E. W. Landor, *Secretary*.

Albany Committee.—Sir Alexander Campbell, Bart., Messrs. S. Knight, and John McKail.

Toodyay, Northam, and Victoria Plains Committee.—Messrs. Alfred Durlacher, James Drummond, Sen., James Drummond, Jun., James M. Dempster, A. W. Morgan, Donald McPherson, and Bishop Salvado.

York and Beverley Committee.—Messrs. Lewis Bayly, W. Cowan, S. E. Burges, and S. S. Parker.

Bunbury and Austrialind Committee.—Messrs. George Eliot, W. Pearce Clifton, and Thomas Little, Sen.

Vasse Committee.—Messrs. Joseph Harris, Col. Molloy, J. G. Russell, and W. R. Bunbury.

Champion Bay Committee.—Messrs. Charles Symmonds, J. S. Davis, Thomas Burges, and William Gale.

NOTICE TO INSTITUTIONS.

The following are the arrangements for the Excursion to the Crystal Palace, Tuesday next, August 27:—

The doors of the Palace will be opened at ten a.m.

At 12.30 p.m.—The full orchestral band of the Crystal Palace Company, in the Concert-room adjoining the Centre Transept.

2 p.m.—Great Handel Festival organ performance.

3 p.m.—Mr. B. Waterhouse Hawkins has kindly undertaken to deliver a lecture on the "Gorilla and other Monkeys contrasted with Man," in the Lecture Theatre of the School of Science, Art, and Literature.

4 p.m.—Display of the Great Fountains and entire series of Waterworks.

5 p.m.—The Full Orchestral Band of the Company.

Grand Poultry Show throughout the day.

The following departments devoted to Industrial Science and Art will be found particularly interesting to Members of Mechanics' Institutions:—

The Industrial Museum, situated in the gallery of the central transept, containing the agricultural and technological collections. These comprise specimens of all the farm products cultivated in Britain, and of raw products used in the arts and manufactures, with illustrations of the processes involved in their preparation; building stones, coals, and other minerals from British mines, foreign woods, &c.

The Tasmanian Court.

The collections illustrating "The Customs and Products of Modern Egypt."

The products of Greece, recently presented by the Greek Government.

The illustrated collection of British bird's eggs.

A collection of flint implements found in the drift, and specimens of stone weapons now in use among various tribes.

N.B. These five interesting collections are at the further end of the Tropical Department.

The Indian and Chinese collections, and the Naval Museum and Engineering Models, in the Gallery at the tropical end of the Palace.

The Picture Gallery containing amongst other works a collection of copies of the Queen's private pictures.

At the basement of the building the whole of the various processes connected with the Cotton Manufactures will be in full operation during the day.

Arrangements are provided in the grounds for cricket, archery, quoits, gymnastics, boating, &c.

PROGRAMME OF EXAMINATIONS FOR 1862.*

PRELIMINARY NOTICE.

I. Any person, male or female, not under sixteen years of age, may undergo the Examinations described in the following Programme. They were established to encourage, test, attest, and reward efforts made for self-improvement by adult members and students of the Mechanics' Institutions, Athenæums, People's Colleges, Village Classes, and other Educational Bodies of the like character, in Union with the Society of Arts. Such members and students are commonly mechanics, artisans, labourers, clerks, tradesmen and farmers not in a large way of business, apprentices, sons and daughters of tradesmen and farmers, assistants in shops, and others, of various occupations, who are not Graduates, Undergraduates, or Students of a University, nor following or intending to follow a learned profession, nor enjoying nor having enjoyed a liberal education. To all such members and students, and also to persons of the like condition in places where there are no Institutions able to enter into the Union, the Examinations, Certificates, and Prizes (see page 680) are offered by the Society of Arts. See paragraph 1 (*A. B. C.*), next page.

II. Teachers and Pupil Teachers may be examined and receive Certificates, but cannot compete for Prizes.

III. Persons of a different grade in society, though their admission to the Examinations with the view of obtaining Certificates is provided for, cannot compete for Prizes. See paragraph 1 (*D*).

LIST OF SUBJECTS AND EXAMINERS FOR 1862.

*** Candidates, before choosing their subjects, should refer to the Time-table, at page 676.

1. Arithmetic	Rev. Alexander Wilson, M.A., National Society, London.
2. Book-keeping	John Ball, Esq., of the firm of Messrs. Quilter and Ball.
3. Algebra	J. J. Sylvester, Esq., M.A., F.R.S., Professor of Mathematics at the Royal Military Academy, Woolwich.
4. Geometry	Rev. B. Morgan Cowie, M.A., Professor of Geometry at Gresham College; one of H.M. Inspectors of Schools.
5. Mensuration	John Sykes, Esq., M.A., Fellow of Pembroke College, Cambridge, Assistant Secretary to the Committee of Privy Council on Education.
6. Trigonometry	Rev. T. G. Hall, Professor of Mathematics in King's College, London.
7. Conic Sections	Rev. Bartholomew Price, M.A., F.R.S., Sedleian Professor of Natural Philosophy in the University of Oxford.
8. Navigation and Nautical Astronomy	John Riddle, Esq., F.R.A.S., Head Master of the Nautical Schools, Greenwich.
9. Principles of Mechanics	Rev. Jonathan Bates, M.A., Fellow of Gonville and Caius College, Cambridge, Vice-Principal of the Diocesan Training College, Chester.
10. Practical Mechanics	T. M. Goodeve, Esq., Professor of Mechanics at the Royal Military Academy, Woolwich
11. Magnetism, Electricity, and Heat	Charles Brooke, Esq., M.A., F.R.S., Surgeon to the Westminster Hospital.
12. Astronomy	James Glaisher, Esq., F.R.S., Royal Observatory, Greenwich.
13. Chemistry	A. W. Williamson, Esq,, Professor of Chemistry, University College, London.
14. Animal Physiology (in relation to Health)	John Marshall, Esq., F.R.S., F.R.C.S., Surgeon to the University College Hospital, and Lecturer on Anatomy in the Government Department of Science and Art.
15. Botany	Dr. Lindley, F.R.S., Professor of Botany in the University of London, and Hon. Sec. of the Horticultural Society.
16. Agriculture	J. C. Morton, Esq.
17. Mining and Metallurgy	J. Arthur Phillips, Esq., Civil Engineer, Graduate of the Imperial School of Mines of France, &c.
18. Political and Social Economy	Charles Neate, Esq., M.A. Professor of Political Economy in the University of Oxford.
19. Domestic Economy	The Very Rev. Richard Dawes, F.R.S., Dean of Hereford.
20. Geography	Wm. Hughes, Esq., F.R.G.S., Professor of Geography in Queen's College, London.
21. English History	C. H. Pearson, Esq., M.A., Professor of Modern History, King's College, London.
22. English Literature	Rev. Samuel Clark, M.A., F.R.G.S., Principal of the Training College, Battersea, *Chairman of the Board.*
23. Logic and Mental Science	Rev. Wm. Thomson, D.D., Provost of Queen's College, Oxford.
24. Latin and Roman History	Rev. F. Temple, D.D., Head Master of Rugby School.
25. French	Alphonse Mariette, Esq., M.A., Professor of French, King's College, London.
26. German	Dr. Bernays, Professor of German, King's College, London.
27. Freehand Drawing	F. S. Cary, Esq.
28. Mechanical Drawing	Thomas Bradley, Esq., Professor of Geometrical Drawing in King's College, London.
29. Theory of Music	John Hullah, Esq.

* The papers set at the last Examination are now published in the form of a pamphlet, which may be had of Messrs. Bell and Daldy, 186, Fleet-street, price 6d.

TERMS OF ADMISSION TO THE EXAMINATIONS.

1. Every Candidate for Examination must be admitted through a Local Educational Board connected with the Society of Arts, and be at least sixteen years of age.

(*A*.) Members of, or students of classes in, Institutions in direct Union with the Society of Arts, are admitted	Free.
(*B*.) Members of, or students of classes in, "Small Institutions"* not in direct Union with the Society of Arts, but connected with a Provincial Union that is "in Union" with the Society, are admitted on payment of a fee of..................	2s. 6d.
(*C*.) In districts where there are no Institutions at all, or only "small Institutions,"* Local Educational Boards, paying one guinea a year to the Society of Arts, may admit candidates on payment of a fee of............................	2s. 6d.
(*D*.) Persons of a higher class of society than those described in paragraph 1 (Preliminary Notice), are admitted to the Examinations on payment of a fee of	10s. 6d.

N.B.—The Council in every case leave it to the Local Board to decide whether a candidate should pay this fee.

2. Candidates coming under the head (*D*), as well as Teachers and Pupil Teachers, though they may be examined and receive certificates, cannot compete for the prizes of which details are given at page 680.

3. In any locality, whether there be an Institution in union with the Society of Arts or not, the first thing to be done to enable any person to take advantage of the Society's Examinations, is to form a Local Educational Board.

LOCAL EDUCATIONAL BOARDS.†

4. The Managers of Institutions in Union with the Society of Arts, and other persons desirous to cooperate with the Society in promoting the instruction of adults, are invited to form Local Boards. Each Local Board must consist of at least three members; and, with advantage, may be much more numerous. There must be a Chairman and a Secretary. The district for which the Board is to act should be defined; and every Educational Institution‡ within those limits ought to be represented in the Board. It is of great importance that each Local Board should include the representatives of more Institutions than one, and that there should not be more than one Local Board in each locality. The composition of the Board must be such as to command the respect and confidence of the neighbourhood. Where gentlemen of high literary and scientific attainments are willing to serve on the Board, their services are of great value; but the necessary work may be done by any well-educated persons of high character and good sense. No member of a Local Board can be a candidate for examination.

5. A detailed list of the chairman, secretary, and other members of each Local Board, giving not only their names but their addresses and designations, should be submitted to the Council of the Society of Arts before the 1st of January, 1862. In some cases the Local Educational Boards comprise such large districts that, for the convenience of the Candidates, Branch Local Boards have to be formed within the Districts. Wherever this is the case, the names and addresses of the members, both of the District Board and of its Branch Boards, must be forwarded to the Secretary of the Society of Arts. All changes in the composition of the various Boards now in existence, or to be formed hereafter, should be immediately notified to the Society of Arts.

6. Local Educational Boards in connection with the Society of Arts need make no payment to the Society, unless they desire to exercise the power of admitting candidates (see par. 1 *C*.) where there are no Institutions in union with the Society of Arts; in which case a subscription of one guinea a year must be paid.

7. The Society's system of Examinations consists of (1) Previous Examinations by the Local Boards, and (2) Final Examinations by the Examiners of the Society of Arts, under the supervision of the Local Boards.

8. *⁎* A Central Committee of Educational Unions and Adult Education Societies, in connexion with the Society of Arts, has been formed to promote uniformity of action and a fixed Standard in the Elementary and Previous Examinations which are held by the Provincial Unions, Adult Education Societies, and Local Boards connected with the Society of Arts. See page 682.

PREVIOUS EXAMINATIONS BY THE LOCAL BOARDS.

9. These Examinations are (1) to test the handwriting and spelling of the Candidates, their knowledge of English Grammar, composition, and the common rules of arithmetic, and (2) to ascertain whether their knowledge of those special subjects in which they seek to be examined by the Society's Examiners is such as to offer a fair prospect of their obtaining certificates. The Previous Examinations may be either wholly written, or partly oral and partly written, at the discretion of each Local Board.

10. HANDWRITING.—A bold, even, round hand, without loops, long tails, or flourishes, should be preferred.

11. SPELLING, ENGLISH GRAMMAR, AND COMPOSITION.—An extract from some standard English author should be set, into which a few errors of spelling, grammar, and punctuation should be introduced. Some faulty grammatical constructions in common use, and vulgarisms, should be submitted for correction.

12. ARITHMETIC. — A knowledge of the elementary rules, including the Rule of Three, should be required.

13. No candidate can be admitted to the Final Examination without a certificate (Form No. 4 in Appendix) from his Local Board, that he has satisfactorily "passed" its previous Examination in the elementary subjects specified in paragraphs 10, 11, and 12, and in the special subjects in which he wishes to be examined by the Society's Examiners. If, in any case, a Local Board should be unable itself to examine a Candidate in a special subject, it will be sufficient if that Board notify the fact in the Form No. 4, and add therein that the Board believes the Candidate to be fit to be examined in that subject by the Central Board. N.B.—This relaxation does not apply to music. [See page 682, respecting Central Committee.]

14. The Previous Examinations must be held by the Local Boards sufficiently early in the year 1862 to allow the results to be communicated to the Council, on a Form which will be furnished on application (Form No. 2 in Appendix), on or before the 23d April, *i.e.*, four weeks before the commencement of the Final Examinations.

15. Unreserved communications between the Society and the Local Boards will be requisite to secure to the "passes" of the various Local Boards throughout the Union such an uniformity of value as may be attainable. [See also page 682, Central Committee.]

FINAL EXAMINATION BY THE SOCIETY'S EXAMINERS.

16. The Forms (Form No. 4, in Appendix), containing the names of the "passed" candidates, and the subjects in which they desire to be examined, having been returned to the Secretary of the Society of Arts, not later than the 23rd April, 1862, the printed papers of questions in the various subjects will be prepared by the Society's

* Small Institutions are defined as those which have an income of less than £75 a year.

† For a List of the Boards already formed, with the names of the Secretaries, see page 681.

‡ These Educational Boards, besides superintending the Examinations of the Society of Arts, may advantageously assist in promoting various other plans for the furtherance of Education in their districts; it is, therefore, desirable that they should include representatives not only from the various Institutions for the promotion of adult instruction, but also from the principal schools in the locality. See page 682 respecting the Central Committee for Elementary Examinations.

Examiners, and will be forwarded to the Secretaries of the Local Boards.

17. The whole of the papers appointed for each of the evenings of the Examination, according to the subjoined Time-table, will be contained in a separate sealed envelope, which is not to be opened till the Candidates are present, at half-past six on that evening.

18. The details of the mode in which the Final Examinations are to be conducted, are given in the "Letter of Instructions," (Form No. 6, in Appendix) and every member of each Local Board should make himself thoroughly acquainted with them.

19. The Final Examinations must be held *simultaneously on the days, and at the hours specified in the following Time-table,* at those places where Local Boards are established.

20. In choosing the subjects in which they desire to be examined, candidates must take notice of the arrangements of this Time-table, as they *cannot* be examined in *two* subjects which are set down for the *same* evening.

Time Table for 1862.

No Candidate may work more than one paper on each evening, and each paper must be worked on the particular evening appointed for it.

Tuesday, the 20th May, From 6 30 to 9 30 p.m.	Wednesday, the 21st May, From 6 30 to 9 30 p.m.	Thursday, the 22nd May, From 6 30 to 9 30 p.m.	Friday, the 23rd May, From 6 30 to 9 30 p.m.
Arithmetic. Trigonometry. Magnetism, Electricity, and Heat. Agriculture. Mining and Metallurgy. Mechanical Drawing. German.	Book-keeping. Navigation and Nautical Astronomy. Conic Sections. Chemistry. Music. Domestic Economy. English History.	Algebra. Practical Mechanics. Astronomy. Physiology. Political and Social Economy. French. *English Literature.	Geometry. Mensuration. Principles of Mechanics. Botany. Geography. Latin. Logic and Mental Science. Freehand Drawing.

* Two Papers of one hour and a half each in this subject are considered as one.

21. The Local Boards must see, and certify to the Council, in the form which the Council will furnish (Appendix, Form No. 8), that the papers are fairly worked by each candidate, without copying from any other, and without books or other assistance; and must seal up and return the worked papers to the Council *immediately* on the close of each evening's Examination. The papers will then be submitted to the judgment of the Examiners, and certificates of three grades will be awarded.

22. The names of the candidates who obtain Prizes and Certificates will be published in the *Journal of the Society of Arts,* as soon as the Examiners have pronounced their judgment, and the Prizes and Certificates will subsequently be forwarded to the Local Boards for distribution.

23. A candidate who has obtained from the Society a certificate of the 1st class in any subject, cannot again be examined in the same subject.

24. A candidate who has obtained a certificate of the 2nd or 3rd class may, on the recommendation of the Local Board, be examined in the same subject, in a subsequent year, without again passing the Previous Examination, but the name must always be returned in the proper form (No. 4 in the Appendix).

25. A candidate who, having obtained a certificate in any subject, desires to be examined in some other subject, in a subsequent year, may be "passed" by the Local Board, after examination in that subject, without re-examination in the elementary subjects specified in paragraphs 10, 11, 12.

SUBJECTS OF EXAMINATION FOR 1862.

26. In the following paragraphs will be found a brief outline of the portions of the respective subjects in which the candidates will be examined, and their attention is especially drawn to this part of the programme. Though in most instances the Examiner has set down certain Text-books, in so doing he pronounces no opinion as to their merit. Real knowledge, however or wherever acquired, will be accepted by the Examiners.

I.—Arithmetic.

27. Practice—Simple and Compound Proportion—Interest—Discount—Insurance—Vulgar and Decimal Fractions; with the principles of a Decimal Notation in money on the basis of the pound unit.

28. The questions framed from the preceding syllabus will consist mainly of practical problems, and the Examiner will take into account not only the correctness of the answers, but also the excellence of the methods by which they are worked out, and the clearness and neatness of working, which must always be shown.

29. Text Books:—Any of the modern treatises on Arithmetic, such as Hunter's Text Book (*National Society*), Colenso (*Longmans*), or Barnard Smith (*Macmillan*).

II.—Book-keeping by Double Entry.

30. Candidates should be prepared to answer questions as to the nature and use of the different books usually kept in a merchant's office. They should be prepared to journalise a series of transactions from a waste book, and, having posted the entries to the ledger, to balance the accounts, to prove the correctness of the postings by a trial-balance, and finally to exhibit an account of profit and loss, and a balance sheet.

31. Candidates should be prepared to draw the usual commercial forms, such as receipts, bills of exchange, promissory notes, invoices, account sales, accounts current, bills of parcels, and to explain the meanings of technical terms used in general business.

32. Text Books:—Book-keeping—Irish School Series. (*Groombridge.*)

Rudimentary Book-keeping. (*Weale's Series.*)

Kelly's Elements of Book-keeping. (*Simpkins and Co.*)

III.—Algebra.

33. Elementary Operations and Fractions. Simple and Quadratic Equations and Problems leading to them. Involution and Evolution. Surds. Arithmetical and Geometrical Series. Binomial Theorem.

34. Text Books:—Todhunter's Algebra (*Macmillan*); Colenso's Algebra (*Longmans*), or any other modern treatise on Algebra.

IV.—Geometry.

35. A facility in solving geometrical theorems and problems, deducible from the first six books of Euclid, will be expected on the part of those who desire to obtain certificates of the first or second class.

36. Text Book:—Euclid, Books I., II., III., IV., VI., XI., as far as Prop. 21. Potts' smaller edition (*Parker*).

V.—Mensuration.

37. The calculation of the areas and circumferences of plane figures bounded by arcs of circles or right lines, and solid contents of cones, cylinders, spheres, &c. Candidates will be expected to be familiar with the different rules for measuring and estimating artificers' work, such as joiners', bricklayers', masons', and plumbers' work, and

to be able to prepare estimates of such work from given quantities.

38. Text Books:—Lund's Mensuration, Part III., of his Elements of Geometry and Mensuration. Tate's Mensuration. Young's Treatise on Mensuration (*Simms and M'Intyre*).

VI.—TRIGONOMETRY.

39. In Plane Trigonometry, the formulæ for the trigonometrical functions of the sum of two angles, the numerical solution of plane triangles, and the use of logarithmic tables, &c.

40. Spherical Trigonometry, Napier's Rules, Solution of Spherical Triangles.

41. Text Books:—Snowball's Trigonometry (*Macmillan*), Hall's Trigonometry for Schools (*Christian Knowledge Society*), or any of the modern treatises on Algebraical Trigonometry. Mathematical Tables (*Chambers' Series*).

VII.—CONIC SECTIONS.

42. The properties of the three curves treated geometrically; also as deduced from the cone. The principles of projection, orthogonal and central, applied to derive the properties of the Conic Sections from those of the circle.

43. Analytical Conics, including the equations of the straight line, the circle, the three conic sections, and the general equation of the second degree.

44. Text Books:—Puckle's Conic Sections (*Macmillan*). Todhunter's Conic Sections (*Macmillan*). Salmon's Conic Sections (*Longmans*). Drew's Conic Sections (*Macmillan*). Whewell's Conic Sections (*Parker*).

VIII.—NAVIGATION AND NAUTICAL ASTRONOMY.

45. A good knowledge of Plane and Spherical Trigonometry, of the definitions and terms used in Nautical Astronomy, and of the various measurements of time and their mutual conversions will be required, as well as skill in the use of logarithmic tables, and neatness, order, and accuracy in the numerical solutions of problems. The candidate should understand the construction of charts; the nature and laws of circular storms; great circle sailing, &c.; the methods of determining the latitude, longitude, variation of the compass, and error and rate of a chronometer by astronomical observations, with the demonstrations of the formulæ employed; the use of Nautical Astronomical Instruments, &c.

46. Text Books:—The Nautical Almanac. (*Murray.*) Riddle's Navigation and Nautical Astronomy. (*Law*, Essex-street.)

IX.—PRINCIPLES OF MECHANICS.

47. The properties of matter, solid, fluid, and gaseous.

48. Statics: The composition, resolution, and equilibrium of pressures acting on a material particle; constrained particles; machines; attractions.

49. Dynamics: Gravitation; collision; constrained motions; projectiles; oscillations.

50. Rigid Dynamics: Motion of a rigid body about a point;—of a free rigid body;—of a system of rigid bodies.

51. Hydrostatics: Pressures of fluids; equilibrium of floating bodies; specific gravity; elastic fluids; machines; temperature and heat; steam; evaporation.

52. Hydrodynamics: Motion and resistance of fluids in tubes, &c.; waves and tides.

53. Pneumatics: Mechanical properties of the air; the barometer.

54. Text Books:—Todhunter's Statics, or Parkinson's Mechanics. Goodwin's Mathematics. Miller's, Phear's, or Webster's Hydrostatics. Webster's Theory of Fluids. The treatise on this subject in Orr's Circle of the Sciences. Golding Bird's Elements of Natural Philosophy, by C. Brooke. (*Churchill.*) Lardner's Handbooks on Natural Philosophy.

X.—PRACTICAL MECHANICS.

55. The Application of the Principles of Mechanism to Simple Machines. The Steam Engine.

56. Text Books:—Lardner on the Steam Engine. Scott Russell on the Steam Engine. Nasmyth's Elements of Mechanism, with Remarks on Tools and Machinery. (*Weale.*) Goodeve's Elements of Mechanism. (*Longmans.*)

XI.—MAGNETISM, ELECTRICITY, AND HEAT.

57. Construction and Properties of Magnets; Magnetic Instruments; Terrestrial Magnetism; Diamagnetism.

58. Statical or Franklinic Electricity; Voltaic Electricity; Electro-dynamics; Electro-telegraphy; Electro-metallurgy; Thermo-Electricity; Organic Electricity.

59. Conduction, Convection, and Radiation of Heat; Instruments for measuring Heat; Specific and Latent Heat; Reflection and Refraction of Heat; Diathermancy.

60. Text Books:—Golding Bird's Elements of Natural Philosophy, by C. Brooke. (*Churchill.*)

Lardner's Handbooks of Natural Philosophy. (*Walton and Maberly.*)

Herschel's Discourse on the Study of Natural Philosophy (*Longmans*) for a *general* view of the subjects.

XII.—ASTRONOMY.

61. The Principles of Plane Astronomy.

62. Text Books:—Herschel's Astronomy. (*Longmans.*) First chapters.

Airy's Lectures on Astronomy.

Maddy's Elements of Astronomy.

Practical Astronomy, (Orr's Circle of the Sciences.)

XIII.—CHEMISTRY.

63. Physical. Elementary laws of heat, light, and electricity, in connection with chemical action.

Inorganic. Chemistry of the metalloids and metals, laws of combining proportions, volumes of gases, vapours, &c.

Organic. Composition, properties, and decompositions of alcohols, acids, &c.

64. Candidates are expected to be able to explain decompositions by the use of symbols. Questions illustrative of general principles will be selected from the following, amongst other trades and manufactures: Metallurgy of Lead, Iron, and Copper; Bleaching, Dyeing, Soap-boiling, Tanning; the manufacture of Coal-Gas, Sulphuric Acid, &c.

65. Text Books:—Fownes' Manual of Elementary Chemistry. Miller's Elements of Chemistry.

XIV.—ANIMAL PHYSIOLOGY, IN RELATION TO HEALTH.

66. The general principles of Animal Physiology, and the application of them to the preservation of health and to the wants and emergencies of daily life.

67. Text Books:—Carpenter's Animal Physiology, 1859. (*Bohn.*)

Lardner's Animal Physics. (*Walton and Maberly.*)

Translation of Milne Edward's Manual of Zoology. (*Renshaw.*)

Marshall's Description of the Human Body, with Atlas (*Day and Sons*), for details of Anatomy.

XV.—BOTANY.

68. Sect. I. Vegetable Physiology. The general Structure of a Plant. The manner in which the organs perform their several functions; and the external agents which influence them. The nature of their principal tissues. The application of such facts to practical purposes.

69. Text Books:—Lindley's Theory and Practice of Horticulture (*Longmans*); or the same author's School-Botany, the edition of 1854, or any later one. (*Bradbury and Evans.*)

70. Sect. II. Practical Botany. The meaning of Botanical Terms. The general facts r... ting to Botanical Classification, excluding that of Linnæus. The Distinctions of some of the principal English Natural Orders of Plants *not* Cryptogamic. Naming Plants not Cryptogamic

at sight. The art of Describing Plants correctly. (For this living specimens will be provided.)

71. Text Books:—Lindley's School Botany, and Descriptive Botany. (*Bradbury and Evans.*)

72. Candidates will be expected to answer correctly six questions in Section I., and eight questions in Section II.; each Botanical description standing for one answer. The questions in both sections will have reference exclusively to subjects having some practical application. No one can pass who is not able to answer fairly the questions in Section II., proficiency in which will be rated higher than in Section I. Students are earnestly recommended to study diligently "Descriptive Botany," and the Physiological Aphorisms at the end of "School Botany;" and also to apply themselves diligently to the study of the wild or common hardy garden plants to which they may have access. A knowledge of Field Botany will rank much higher with the Examiner than Botany merely picked up in books.

XVI.—Agriculture.

73. By eighteen or twenty questions on 1, The tillage of the soil; 2, The cultivation of crops; and 3, The management of live-stock; the Examiner will endeavour to ascertain the existence of such a knowledge of the theory and practice of Agriculture as must to some extent have been acquired in the field. A certificate will be easily obtained by any one able to direct the labour of the farm, who has also read any of the following standard Agricultural works:—

74. Morton's Cyclopædia of Agriculture. (*Blackie.*) Stephen's Book of the Farm. (*Blackwoods.*) Johnstone's Agricultural Chemistry. (*Blackwoods.*) Low's Elements of Practical Agriculture. (*Longmans.*)

XVII.—Mining and Metallurgy.

75. Candidates should be able to identify with facility the ores of the more common metals, and be acquainted with their chemical compositions. They should also be familiar with the forms of occurrence of the various metallic ores, and the usual methods employed for their extraction and subsequent purification by crushing, stamping, and washing, &c. Underground surveying, principles of ventilation, particularly as applicable to collieries. A knowledge of furnace assaying, and a general acquaintance with the metallurgy of the more important metals.

76. First-class certificates can be given to those only who have either acquired some practical knowledge of mining, or who possess a special acquaintance with the metallurgy of at least one of the useful metals.

77. Text Books:—Dana's Mineralogy (*Trubner and Co.*, Paternoster-row). Mitchell's Assaying (*Baillière*). Manual of Metallurgy (*Griffin*). Useful Metals and their Alloys (*Houlston and Wright*). Ure's Dictionary of Arts, Manufactures, and Mines (*Longmans*).

XVIII.—Political and Social Economy.

78. Text Books:—Jones's Lectures on Political Economy, edited by Whewell. Principles of Political Economy, by John Stuart Mill.

The Phenomena of Industrial Life, edited by the Dean of Hereford. (*Groombridge.*)

Whateley's Lectures on Political Economy. (*Parker.*)

79. Some knowledge of the Commercial, Financial, and Statistical History of the United Kingdom will be required, for which "Porter's Progress of the Nation," and "M'Culloch's Commercial Dictionary," "Merivale's Lectures on Colonisation and the Colonies" (new edition) may be consulted.

N.B.—The Principles of Political Economy, by John Stuart Mill, need be studied only by those who aspire to a first-class Certificate.

XIX.—Domestic Economy.

80. By this is meant a knowledge of the management of household matters, and the principles on which they are conducted; the "why and the wherefore" of everything under this head. For instance, as regards food, animal and vegetable, how differing in nutriment, &c., cookery, &c.

81. Clothing of various kinds, how best fitted for varying climates, seasons, and occupations, &c.

82. The Sanitary regulations of the house, such as ventilation, warming and lighting, drainage, &c. A knowledge of the weights and measures by which the prices of provisions, &c., are regulated; in fact, how to make the most of a small income.

83. A knowledge also of the principles of the Savings Bank, and of the accumulation of small savings, of the Benefit Society, of present and deferred annuities.

84. Text Books:—A Manual of Domestic Economy, by Tegetmeier. (*Home and Colonial School Society.*)

Household Economy, by Margaret Brewster. (*Constable and Co.*)

Domestic Economy, by Esther Copley. (*Groombridge and Son.*)

XX.—Geography.

85. All candidates will be expected to possess a sound knowledge of Elementary Geography, both physical and descriptive. Such knowledge will of necessity embrace an acquaintance with at least the outlines of the great natural features of the globe, the political divisions of countries, and the localities of towns and other places of importance. This kind of knowledge will be looked for in fuller extent with regard to the British Islands, and the various portions of the British Empire, than in respect of other countries. Among the tests applied to it, will be to make, from memory, a sketch, showing the chief features of any particular country in Europe named by the Examiner, and also to sketch a map of the county in which the candidate may be resident. It will not of course be expected that such sketches should possess accuracy of detail, but they should at least show the general direction of coast-lines, mountain-chains, or river-courses, with the localities and names of the principal towns. The map of any particular locality should embody the chief national features which the district may include (with the situation of coal-fields, if any), and should have marked upon it any localities which are distinguished as seats of manufacturing or commercial industry.

86. In addition to the above, candidates who aim at the highest class of certificate should be prepared to answer questions bearing upon Geography in its relation to the Physical Sciences and the History of Mankind—such questions, that is, as involve a general acquaintance with the subject of Climate, the laws of Meteorology, the Distribution of Plants and Animals over the Globe, the leading outlines of Geology, the Ethnographic Division of the Human race, and the commercial resources of different lands. This kind of knowledge is looked for, not in place of geographical knowledge of a more elementary kind, but as supplementary to the latter, and throughout based upon it.

87. Text Books:—

Manual of Geography, by William Hughes. (*Longmans.*)

Guyot's Earth and Man. (*Parker and Son.*)

Physical Geography, by Sir John F. W. Herschel. (*A. and C. Black.*)

Physical Geography of the Sea, by Maury. (*Philip & Son.*)

Page's Introductory Text Book of Geology. (*Blackwood.*)

The General Atlas (*published by the National Society*).

The School Physical Atlas (*either Johnstone's or that published by the National Society*).

XXI.—English History.

88. A general knowledge of the outlines of English History. A special knowledge of English History during the reign of James II.

89. Text Books:—

Macaulay's History of England. Vols. I. and II. (*Longmans.*)

Creasy's Rise and Progress of the English Constitution. (*Bentley.*)
The Student's Hume. (*Murray.*)

XXII.—English Literature.

90. Any two, but not more than two, of the authors in the following list may be taken up for examination:—
Chaucer. Prologue to the Canterbury Tales.
Milton. Comus; Samson Agonistes; Lycidas; L'Allegro; Il Penseroso; Hymn on the Nativity.
Shakspeare. Hamlet; Henry V.; the Tempest.
Izaak Walton. Lives of Hooker, Herbert, and Sanderson.
Coleridge. Ancient Mariner; Christabel; Translation of Wallenstein.
91. Or one of the following works may be taken, with one of the above-mentioned authors:—
Trench. Lectures on the Study of Words.
Reed. Introduction to English Literature from Chaucer to Tennyson.
92. Candidates are recommended to make a very careful study of the text of the authors they may select. The questions on each author will be divided into two sections, the first intended to test the candidate's acquaintance with the text, the second his knowledge of the subject-matter and his critical and literary information. Full marks will not be given for answers in the second section, if those in the first section do not prove satisfactory.

XXIII.—Logic and Mental Science.

93. Logic: Candidates will be expected to answer questions on the different processes of thought, and on the connexion of thought and language. Every Candidate must attempt to analyse examples of reasoning, and to detect fallacies.
94. Text Books:—Whateley's Elements of Logic, or Thomson's Outline of the Laws of Thought.
95. A Candidate for a second or third-class Certificate will be expected to prepare, in addition, any one of the following books which he may select:—Bacon's Novum Organum, Book I. (English Translation); Bishop Butler's Sermons; Paley's Moral Philosophy; Dugald Stewart's Philosophy of the Human Mind, Volume I.
96. A Candidate for a first-class Certificate will be expected to prepare any two of these works which he may select.

XXIV.—Latin tnd Roman History.

97. Livy, Book iv.
Virgil. Æneid, Book ix.
Roman History to the death of Augustus Cæsar.
98. Text Book:—Liddell's History of Rome (in one volume).

XXV.—French.

99. The Examination paper will be divided into three parts.
100. The first will comprise grammatical questions and an extract from a modern French writer to be translated into English. Candidates aiming at a 3rd class certificate should confine themselves to this first part.
101. The second part will comprise an English extract to be translated into French, and a list of idiomatic expressions to be rendered from French into English, or *vice versâ*. This should be done satisfactorily by the candidate who aims at a second-class certificate.
102. In the third part, candidates for a 1st class certificate will have, in addition to a portion of the above, to answer properly (*in French*) some *elementary* questions on the three following subjects:
(1.) French literature in the first half of the 17th century (from Montaigne to Descartes).
(2.) French Weights and Measures, as compared with the English.
(3.) The History of France during the Administration of Cardinal Richelieu and that of Mazarin (1624-1661.)
103. Books recommended:—Nisard: Histoire de la Littérature Française. (*Williams and Norgate*, London and Edinbro'.) Duruy: Histoire de France. (*Williams and Norgate.*)

XXVI.—German.

104. Schiller's Geschichte des Dreissigjahrigen Krieges.
Schiller's Die Piccolomini (Wallenstein).
Göthe's Egmont.
Kohlrausch's Deutsche Geschichte.
105. Pieces from each of the above works will be given for translation. Every candidate must translate one piece. First-class certificates will be given to those only who translate well from English into German, and write in German a good Essay relating to German history during the French Revolutionary Wars, the subject of which will be given to them when they come up for examination.

XXVII.—Freehand Drawing.

106. In freehand drawing the Candidate will be required to show a practical knowledge of the principles usually applied to the imitation of natural and artificial forms, such as geometrical models, furniture, manufactured articles, foliage, and the human form.

XXVIII.—Geometrical Drawing.

107. Practical Geometry, or Geometrical Drawing, required by the Mechanist, Engineer, Builder, and all in any way employed in the arts of construction. The Candidate will be examined in Practical Plane Geometry, right line figures of given areas, curve lines required in the arts, &c., in Practical Solid Geometry, Elementary Problems on the line and plane, and their combinations, the representation by orthographic projection of simple solids from conditions, and in the principles of Development as used in the construction of Maps, &c., and in Elementary Perspective Projection as far as it is required by the Architect.
108. Text-books:—Geometry, Plane, Solid, and Spherical (*Library of Useful Knowledge*) is especially recommended as a work to be studied on Theoretical Geometry. Practical Plane Geometry.—Elements of Geometrical Drawing, published for the Committee of Council on Education, 2 parts. (*Chapman and Hall*).—Practical Geometry, Linear Perspective and Projection (*Library of Useful Knowledge*). For Descriptive Geometry.—Hall's Elements of Descriptive Geometry for Students in Engineering. Heather's Descriptive Geometry. Also the following French Works, which are mentioned in consequence of the great deficiency of English Works on Geometrical Drawing:—Elémens de Géométrie Descriptive, par S. F. Lacroix; Traité de Géométrie Descriptive, par Levebure de Fourcy; Nouveau Cours raisonné de Dessin Industriel, par Armengaud, ainé, et Armengaud, jeune, et Amouroux; Bardin's Works on Descriptive Geometry.

XXIX.—Theory of Music.

109. Notation, the modern modes, intervals, time signatures, the stave, transposition, modulation, terms and characters in common use.
110. The Elements of Harmony.
111. Musical History and Biography.
112. Arrangements must be made, in the Previous Examination by the Local Boards, to test Candidates, by oral examination, in their knowledge or appreciation of the *sound* of musical successions and combinations. A form of the test to be used for this purpose by the Local Board at the Previous Examination will be sent by the Council to such Local Boards as may *apply for it*, in due time before the Examination.

PRIZES FOR 1862.

THE PRINCE CONSORT'S PRIZE.

113. His Royal Highness the President of the Society has been pleased to offer annually to the candidate who, obtaining a certificate of the first class in the current year, shall have obtained in that year and the three years immediately preceding it, the greatest number of such certificates, a Prize of Twenty-five Guineas. This Prize cannot be taken more than once by the same candidate. It will be accompanied by a certificate from the Society of Arts, setting forth the special character of the Prize, and the various certificates for which it was granted.

GENERAL PRIZES.

1. Arithmetic	First Prize, £5. Second Prize, £3.
2. Book-keeping	First Prize, £5. Second Prize, £3.
3. Algebra	First Prize, £5. Second Prize, £3.
4. Geometry	First Prize, £5. Second Prize, £3.
5. Mensuration	First Prize, £5. Second Prize, £3.
6. Trigonometry	First Prize, £5. Second Prize, £3.
7. Conic Sections	First Prize, £5. Second Prize, £3.
8. Navigation and Nautical Astronomy	First Prize, £5. Second Prize, £3.
9. Principles of Mechanics	First Prize, £5. Second Prize, £3.
10. Practical Mechanics	First Prize, £5. Second Prize, £3. Additional* by Gift of The Rev. J. M. Prower:— Third Prize, £2, and Three Prizes of Books, value £1 each.
11. Magnetism, Electricity, and Heat	First Prize, £5. Second Prize, £3.
12. Astronomy	First Prize, £5. Second Prize, £3.
13. Chemistry	First Prize, £5. Second Prize, £3.
14. Animal Physiology (in relation to Health)	First Prize, £5. Second Prize, £3. Additional by Gift of Harry Chester, Esq.:— Third Prize, £2, and Three Prizes of Books, value £1 each.
15. Botany	First Prize, £5. Second Prize, £3. Additional by Gift of Dr. Lindley, F.R.S.:— Third Prize, £2, and Three Prizes of Books, value £1 each.
16. Agriculture	First Prize, £5. Second Prize, £3. Additional by Gift of J. C. Morton, Esq.:— Third Prize, £2, and Three Prizes of Books, value £1 each.
17. Mining and Metallurgy	First Prize, £5. Second Prize, £3. Additional by Gift of Sir Thomas Phillips, F.G.S.:— Third Prize, £2, and Three Prizes of Books, value £1 each.
18. Political and Social Economy	First Prize, £5. Second Prize, £3. Additional by Gift of the Very Rev. the Dean of Hereford:— Third Prize, £2 2s., and Three Prizes of Books, value £1 1s. each.
19. Domestic Economy	First Prize, £5. Second Prize, £3. Additional by Gift of the Very Rev. the Dean of Hereford:— Third Prize, £2 2s., and One Prize of Books, value £1 1s.
20. Geography	First Prize, £5. Second Prize, £3.
21. English History	First Prize, £5. Second Prize, £3. Additional by Gift of C. Wentworth Dilke, Esq:— Third Prize, £2; and Three Prizes of Books, value £1 each.
22. English Literature	First Prize, £5. Second Prize, £3. Additional by Gift of C. Wentworth Dilke, Esq:— Third Prize, £2; and Three Prizes of Books, value £1 each.
23. Logic and Mental Science	First Prize, £5. Second Prize, £3.
24. Latin and Roman History	First Prize, £5. Second Prize, £3.
25. French	First Prize, £5. Second Prize, £3.
26. German	First Prize, £5. Second Prize, £3.
27. Freehand Drawing	First Prize, £5. Second Prize, £3.
28. Mechanical Drawing	First Prize, £5. Second Prize, £3.
29. Theory of Music	First Prize, £5. Second Prize, £3.

* Should any further "Additional" Prizes be offered, notice of them will be given in the *Journal*.

GOVERNMENT APPOINTMENTS.

114. Nominations to compete for appointments in the Civil Service have been from time to time placed at the disposal of the Council, by members of her Majesty's Government, and these have been presented to Candidates who distinguished themselves at the Society's Examinations. The following is a List of the candidates who have thus obtained appointments:—

Charles Chambers, Leeds Mechanics' Institution—Inland Revenue.
Robert Abbott, Leeds Mechanics' Institution — Privy Council Office.
William Matthew Taylor, Windsor and Eton Literary and Scientific Institution—Privy Council Office.
Edward Highton, Leicester Mechanics' Institution—Privy Council Office.
Edward Philip Plowman, Bury St. Edmund's Commercial School—Privy Council Office.
Thomas Ross Howard, Crosby Hall Evening Classes—Customs.
George Edward Skinner, Lymington Literary Institution —Customs.
George Harrison, Leeds Young Men's Christian Institute —Supernumerary Surveyorship of Taxes.
George Best, Leeds Mechanics' Institution — Supernumerary Surveyorship of Taxes.
George William Wicker, Portsea Watt Institute—Privy Council Office.
John Palethorp, Glasgow Mechanics Institution—Privy Council Office.
Archibald S. Lang Macdonald, Glasgow Mechanics' Institution—Privy Council Office.

LOCAL EDUCATIONAL BOARDS.

The following is a List of the places at which Boards have already been formed, with the names of the Secretaries, from whom intending Candidates may obtain information relative to the Examinations:—

Local Boards.	Secretaries.
Aberdeen	Mr. James Sinclair, Mechanics' Institution, Aberdeen.
Aldershot District	Mr. Barrow Rule, M.C.P., Principal of the Classical and Mathematical School, Aldershot.
Andover	Rev. H. M. White, Andover.
Ashbourne	Mr. C. J. Welsh, Ashbourne.
Ashford	Mr. F. Garaway, Schoolmaster, Ashford New Town.
Bacup	Dr. J. H. Warrall, Bacup.
Banbury	Mr. John H. Beale, Banbury.
Barnet	Mr. John Thimbleby, Barnet.
Battersea	Mr. T. E. Hardy, Bridge-road west, and Lammas-hall, Battersea, S.W.
Belfast	Rev. William Julius McCullagh, Ballysillan, Belfast.
Berkhampstead	Mr. J. R. Crawford, M.A., Master of Grammar School.
Birmingham and Midland Institute	Mr. John Jaffray, Newspaper Proprietor, New-street, Birmingham.
Bishop's Stortford	Mr. F. Woodham Nash, B.A., Sion House, Birchanger, Bishop's Stortford.
Blackburn	Mr. Robert C. Radcliffe, Solicitor, Blackburn.
Blandford	Mr. James B. Green, Architect and Surveyor, Salisbury-street, Blandford.
Bradford	Mr. M. H. Walls, 66, Victoria-street, Bradford.

Local Boards.	Secretaries.
Brighton (for Sussex)	Mr. Barclay Phillips, 75, Lansdowne-place, Brighton.
Bristol	Mr. J. F. R. Daniel, Athenæum, Bristol.
Brompton (near Chatham)	Mr. J. Greenleaf, St. Mary's-vale, Brompton, Chatham.
Bucks and Berks Adult Education Society, Windsor	Rev. Thomas Rooke, M.A., St. Alban-street, Windsor.
Bury	Mr. Edward Bunting, Athenæum, Bury.
Canterbury	Rev. Edward Gilder, M.A., Canterbury.
Carlisle, Young Men's Christian Association.	Mr. John Eccleston.
Carlisle, Church of England Association	Mr. Thos. Harris, Stationer, 51, Castle-street, Carlisle.
Carlisle, Mechanics' Institute	Mr. W. A. Williamson, Mechanics' Institute, Carlisle.
Carshalton	Mr. Wm. Morley, jun., North-street, Carshalton.
Chelmsford	Mr. Edwin Adams, M.R.C.P., Guildford-terrace, Chelmsford.
Croydon	Mr. Francis Warren, Bookseller, 131, High-street.
Darlington	Mr. Geo. S. Gibbs, Mount Pleasant, Darlington.
Deptford	Mr. Thomas Garland, 2, Wellington-grove, Greenwich-road, S.E.
Derby	Mr. H. M. Holmes, Hon. Local Sec. to the Society of Arts, London-road, Derby.
Devonport	Mr. William Mogg and Mr. Samuel Chapple, Mechanics' Institute, Devonport.
Glasgow, Athenæum	Mr. Moses Provan, Accountant, 110, West George-street, Glasgow.
Glasgow Institution	Mr. John Craig, F.E.I.S., Glasgow Institution, 37, Cathedral-street, Glasgow.
Glasgow, Mechanics' Institution	Mr. James Inglis, 5, Buchanan-street, Glasgow.
Glasgow, Popular Evening Classes, Andersonian University	Mr. Robert B. Smith, Teacher of English and Classics, Andersonian University.
Halifax, Mechanics' Institution	Mr. A. C. Foster, Wentworth-cottage, Halifax.
Halifax, Working Men's College	Mr. Geo. Gibb, 20, Corporation-street, Halifax.
Hartlepool (West)	Mr. Thomas Preston Brunton, Solicitor, West Hartlepool.
Hertford	Mr. John Marchant, jun., Port-vale, Hertford.
Hitchin	Mr. Joseph Pollard, Highdown, near Hitchin.
Holmfirth	Mr. J. Batley, South-lane, Holmfirth.
Ingrow-cum-Hainworth	Mr. Jackson, Ingrow-cum-Hainworth.
Ipswich	Mr. Herbert Wright, 44, Handford-road, Ipswich.
East Lancashire Union of Mechanics' Institutes, Burnley	Mr. John Sutherland, Post-office, Burnley.
Leeds Yorkshire Union	Mr. Barnett Blake, Agent of the Yorkshire Union of Mechanics' Institutes. Mr. John Pickering, Secretary of the Leeds Mechanics' Institution.
Leeds Young Men's Christian Association	Mr. Mark Scott, 9, East-parade, Leeds.

Local Boards.	Secretaries.
Leicester	Rev. J. O. Picton, Leicester.
Liverpool	Rev. A. Hume, D.C.L., and LL.D., 24, Clarence-street, Everton.
Lockwood	Mr. Alfred Lee, Mechanics' Institution, Lockwood.
London Domestic Mission Reading-room	Mr. T. C. Clarke, Beresford-terrace, Highbury New-park, N.
" Mechanics' Institution	Mr. T. A. Reed, 41, Chancery-lane, W.C.
" Polytechnic Institution (Limited)	Mr. E. V. Gardner, Professor of Chemistry, Polytechnic Institution, W.
" Metropolitan Evening Classes, Sussex Hall	Mr. H. W. Hansen, Sussex Hall, Leadenhall-street, E.C.
" St. Stephen's, Westminster	Mr. Samuel Elliott, Emery Hill's School, Rochester-row, Westminster, S.W.
" St. Thomas, Charterhouse Evening Classes	Rev. R. Holme, 7, Charterhouse-square, E.C.
" Clerkenwell Institute	Mr. Chas. Binyon, Clerkenwell Institute, St. James's-walk, Clerkenwell-green, E.C.
Louth	Mr. Benjamin Crow, Mechanics' Institution, Louth.
Lynn (King's)	Mr. T. Burton, 23, South Everard-street, Lynn.
Macclesfield	Mr. D. B. Curwen, Park-lane, Macclesfield.
Manchester	Mr. Thomas Marshall, Manchester Mechanics' Institution.
Middlesbro'	Mr. William Taylor, Mechanics' Institute, Middlesbro'.
Newbury	Mr. T. Gurney, Newbury.
Newcastle-on-Tyne Church of England Institute	Mr. Joseph Forster, Church of England Institute, Newcastle-on-Tyne.
Newcastle-on-Tyne Mechanics' Institution	Mr. Adam Carse, 18, Mosley-street, Newcastle.
Nottingham	Dr. W. Tindal Robertson, Nottingham.
Oldham	Rev. John Hodgson, Queen-street, Oldham.
Paisley	Dr. W. B. Mc Kinlay, Paisley.
Pembroke Dock	Mr. Augustus Wiele, H.M. Dockyard, Pembroke Dock.
Peterborough	Mr. C. T. Cotton, Long-causeway, Peterborough.
Portsea (Watt Institute)	Mr. Andrew Murray, C.E. Royal Dockyard.
Richmond	Rev. W. Bashall, A.M., 3, Cambridge-villas, Richmond-hill, S.W.
Rotherham	Mr. Frederick Edwards, Solicitor, Rotherham. Mr. M. H. Habershon, Holmes, near Rotherham.
Salford	Mr. William Noar, Borough Treasurer, Town Hall, Salford.
Scarborough	Mr. William Barry and Mr. Thomas Shields, Town Hall, Scarborough.
Selby	Mr. William Allison, Bank Manager, Selby.
Sheerness	Mr. H. Morgan, 6, Montague-terrace, Sheerness.
Sheffield	Mr. T. Rowbotham, People's College, Sheffield.
Skipton	Mr. George Kendall, Skipton.
Southern Counties' Adult Education Society	Rev. R. Fitzgerald, Winslade, Basingstoke.
South Staffordshire Union of Educational Institutes	Mr. Fred. Talbot, Messrs. Chance's Schools, Smethwick, Birmingham.
Wakefield	Mr. Wm. Williamson, Ch. Clerk, Probate Court, Wakefield.
Warminster	Mr. Frank Morgan, Warminster.
Waterford	Mr. James Budd, Thomas-street, Waterford.
Wigan	Rev. T. F. Fergie, Pemberton-villa, Wigan.
Wirksworth	Mr. William Tomlinson, Mechanics' Institute, Wirksworth.
Worcestershire, Union of Educational Institutes	Rev. W. Walters, Hanley-grange, Upton-on-Severn; Mr. James Tree, Solicitor, Worcester.
Wilton	Rev. R. S. C. Chermside, Wilton.
York	Mr. Charles Cumberland, Institute of Popular Science, York.

APPENDIX.

This Appendix, which is attached to the separate copies of the Programme printed for distribution,* contains the forms that will be forwarded at the proper time to the Local Boards, but as these do not differ materially from those of last year, they are not here reprinted in the *Journal*. The Appendix also contains the List of Prizes and Certificates Awarded, and the Tables of the results of last year's Examinations, with the remarks of the Examiners. These have already appeared in the *Journal*, pages 508, 525, 560, 639.

The preceding pages relate to the Previous and Final Examinations of the Society of Arts. What follows relates to the Elementary Examinations which are held by Unions, Local Boards, and Institutions connected with the Society of Arts, and which are intended to prepare children and others for, and to lead them up to, the Examinations of the Society.

Central Committee for Elementary Examinations held by Provincial and District Unions of Institutions, Adult Education Societies, Local Boards, &c., in connection with the Society of Arts.

Members of the Committee.

Edwin Adams, Esq., M.R.C.P., Chelmsford Local Educational Board.

The Rev. Thomas Bacon, The Hon. and Rev. S. Best, Honorary Secretaries of the Southern Counties Adult Education Society.

Barnett Blake, Esq., Agent of the Yorkshire Union of Mechanics' Institutes.

Harry Chester, Esq., Vice-President of the Society of Arts.

The Rev. Samuel Clark, Chairman of the Central Board of Examiners of the Society of Arts.

The Rev. C. D. Goldie, Member of the Committee of the Bucks and Berks Adult Education Society.

The Hon. and Rev. Godolphin Hastings, M.A., Vice Chairman of the Hertford Local Educational Board.

* Copies may be had gratis on application to the Secretary of the Society of Arts.

The Rev. David Melville, Member of the Council } of the Worcestershire Union of Educational Institutions.
John Slaney Pakington, Esq., President } of the Worcestershire Union of Educational Institutions.
H. E. Montgomery, Esq., Deptford Local Educational Board.
Wm. Newmarch, Esq., Notting-hill Working Men's Association.
Sir Thomas Phillips, F.G.S., Chairman of the Council } of the Society of Arts.
Samuel Redgrave, Esq., Treasurer } of the Society of Arts.
Wm. Spottiswoode, Esq., F.R.S., Member of the Council } of the Society of Arts.
Barrow Rule, Esq., M.R.C.P., Aldershot District Local Educational Board.
F. Talbot, Esq., Secretary of the South Staffordshire Union of Educational Institutions.

I. The Central Committee consists of two representatives of each Provincial and District Union and Adult Education Society, four members of the Council of the Society of Arts, the Chairman of the Society's Central Board of Examiners, and six representatives of Local Educational Boards.

II. The object of the Central Committee is to promote uniformity of action, and a fixed standard, in the Elementary Examinations held by the various bodies in connexion with the Society of Arts.

III. The Central Committee provides for common use a Scheme of Two Elementary Examinations, consisting of two sets of papers, one suited for Junior, the other for Senior Candidates, with corresponding Forms of Certificate, to be awarded by the local authority under which the examination has been conducted.

IV. The Certificate of a Senior Candidate, of sixteen years of age, will be received, without any further "Previous Examination," as a "pass" to the Final Examinations of the Society of Arts, if accompanied by a Certificate from the Local Board or Union, that the Candidate is fit to be examined in the special subject or subjects in the Society of Arts Programme in which he or she proposes to be examined.

V. The Society of Arts prints and distributes, at cost price, the Examination Papers, Certificates, and Circulars, and provides for the correspondence, of the Central Committee.

VI. The Elementary Examinations are not intended to be in any degree competitive. They are open to persons of either sex or of any age.

VII. To prevent the possibility of unfair advantages being taken from a premature knowledge of the Examination papers, the Examinations must be simultaneous everywhere.

VIII. In 1862, they will be held on Tuesday the 11th, Wednesday the 12th, Thursday the 13th, and Friday the 14th of March, after 4 o'clock P.M.

IX. In any case in which a Local Examining Body may examine Candidates in the doctrines of Holy Scripture, in the Prayer Book, or in any other Religious Formulary, the results of such Examination may be stated, by that Local Examining Body, on the Certificate; though the Central Committee, representing a variety of opinions, does not itself provide for Examinations in religious doctrine.

X. The Secretary of each Union, Society, or Board, which desires to use the Examination papers of the Central Committee, must apply for the requisite forms, on or before the 10th February, 1862, to "The Secretary, Central Committee for Elementary Examinations, Society of Arts, John-street, Adelphi, London, W.C."

Scheme of the Examinations for 1862.

Junior Candidates.

1. Every Candidate must be examined in the first four Rules of Arithmetic, simple and compound.

2. Male Candidates must also be examined in two, and Females in one, of the three following subjects :—

A. A General Knowledge of the Gospel History.
B. The Rudiments of English History.
C. The Rudiments of the Geography of England.

3. Female Candidates must also be examined in plain needle-work.

4. Fair writing and spelling, with good reading of a simple narrative, will be required of every Candidate.

5. A satisfactory Examination will entitle the Candidate to a Certificate.

Senior Candidates.

1. Every Candidate must be examined in Arithmetic, including the Rule of Three, Decimal and Vulgar Fractions.

2. Every Male Candidate must be examined in the Geography of the British Isles, and English History from the death of Queen Anne to the accession of Victoria, with the Rudiments of the History from the Conquest.

3. Every Female Candidate must be examined in needle-work.

4. Any Candidate may also be examined in the facts of St. Matthew's Gospel and of the Acts of the Apostles; and the results will be stated on the Certificate.

5. Every Candidate will be required to exhibit, in his or her papers, fairly good handwriting, spelling, and knowledge of grammar.

6. A satisfactory Examination will entitle the Candidate to a Certificate.

INTERNATIONAL EXHIBITION OF 1862.—CATALOGUES.

1. Her Majesty's Commissioners intend to issue three Catalogues; two relating to the Industrial Sections of the Exhibition, and one to the Fine Arts Section. Advertisements as well from exhibitors as from the general public will be received for all three Catalogues.

2. The Catalogues which have reference to the Industrial Sections will be called respectively "The Industrial Catalogue," and "The Illustrated Catalogue;" the third will be "The Fine Arts Catalogue."

3. All matter which is intended for insertion in the body of the Catalogues must be sent in to the Secretary of her Majesty's Commissioners, F. R. Sandford, Esq., 454, West Strand, before the 1st of February, 1862, after which date no alterations or fresh insertions can be guaranteed. Advertisements will be admitted if received before the 1st of March; the rate of charge will be doubled between the 1st of March and the 1st of April, after which day no further advertisements will be received for the first editions. The insertion of all advertisements is subject to the approval of her Majesty's Commissioners. All communications relating to the Catalogues should be addressed to the Secretary, and be legibly endorsed on the outside of the envelope, "*Catalogues.*"

Shilling Catalogues.

4. "The Industrial Catalogue" will be a list containing the name and address of each exhibitor, and a very brief description of his goods. It will be in one volume, demy 8vo., will be sold for one shilling (in the Exhibition Building), and will be produced wholly at the cost of her Majesty's Commissioners.

5. "The Fine Arts Catalogue" will be the same as the Industrial Catalogue in size of page, print, and price, and will also be produced at the cost of her Majesty's Commissioners.

6. "Advertisements" will be inserted in double columns, printed in ruby type, in both these Catalogues, of each of which her Majesty's Commissioners guaranteee an issue of 250,000 copies. The charges for the issue will be as follows :—

	£	s.	d.	
Ten lines or under in one column . .	5	0	0	
For every other line	0	10	0	per line.
For a half-page	30	0	0	
For a whole page	50	0	0	

Advertisements on the wrapper will be charged by special contract.

THE ILLUSTRATED CATALOGUE.

7. "The Illustrated Catalogue" will be an extended form of the (shilling) Industrial Catalogue, containing in addition matter which especially affects the interests of the exhibitors. It will be printed in super-royal 8vo., so that it may range with the Catalogues of 1851 and 1855, and will be published in parts. In order that an idea may be formed of its capabilities and advantages a specimen sheet has been printed.

8. The name, address, and business of every exhibitor will be printed in large type (small pica), with a brief general description of the objects exhibited by each. The printing and paper of this portion will be provided at the cost of her Majesty's Commissioners.

9. One or more classes will form a part, and each part will be sold for one shilling (in the building). Editions of 10,000 of each part will be printed off from time to time.

10. The exhibitors may insert any minute descriptions of the articles they exhibit, with prices or otherwise as they may think fit; also a notice if they have obtained medals at previous Exhibitions. The following will be the tariff of charges:—

For ten lines or under of small type (brevier), in one column, 10s.

For every other line 1s. A whole page £5.

The space occupied by woodcuts will be charged at the same rate.

11. Exhibitors who wish to illustrate their descriptions must provide their own woodcuts or engravings, which will be inserted on the conditions that they do not extend beyond the prescribed margins, and are first approved by the Commissioners.

12. "Advertisements" will be inserted in double columns in each part of the Catalogue, of which it is guaranteed that 10,000 copies shall be issued. The charge for insertion in such an edition of each part will be as follows:—

Five lines or under, in a single column, 10s.; and for every succeeding line 1s. 6d.

A half-page, £5.

Whole page, £10.

Advertisements on the wrappers will be charged by special agreement.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, August* 16*th*, 1861.]

Dated 14*th June*, 1861.

1527. W. C. Thomas, 6, Wells-street, Oxford-street—Imp. in metal casing or armour for the defence of ships and batteries.

Dated 18*th June*, 1861.

1565. W. E. Newton, 66, Chancery lane—Improved apparatus for transmitting motion. (A com.)

Dated 27*th June*, 1861.

1643. W. McNaught, Manchester—An improved method of supporting diagonal, condensing, and other steam engines.
1647. J. Doughty, Craven-buildings, Drury-lane—An improved apparatus for obtaining and applying motive power.

Dated 28*th June*, 1861.

1659. J. B. Hawkins, North-street, Limehouse—Imp. in the construction of cocks for drawing off liquids and vapours, and for regulating the flow or passage thereof.

Dated 1*st July*, 1861.

1671. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in apparatus for manufacturing and bottling ærated liquids. (A com.)
1673. J. Shepherd and W. Goodfellow, Manchester—Imp. in apparatus for carrying off the scum in the water in steam boilers.

Dated 6*th July*, 1861.

1719. J. E. Reid, 20, Fleming-road, Newington—A safety window sash fastner and draught excluder.

Dated 12*th July*, 1861.

1757. W. B. Adams, Holly-mount, Hampstead—Imp. in locomotive engines and trains.

Dated 18*th July*, 1861.

1811. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in capstans and windlasses. (A com.)

Dated 19*th July*, 1861.

1817. R. Mushet, Coleford, Gloucestershire—Imp. in the manufacture of cast steel.
1825. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the manufacture of ships' armour plates and other heavy forgings, and in the machinery or apparatus employed therein. (A com.)

Dated 23*rd July*, 1861.

1842. C. Batty, 196, Marylebone-road—Imp. in the means of preventing the extension of fire in buildings.

Dated 25*th July*, 1861.

1865. B. Brown, and R. Hacking, Bury—Certain imp. in machinery or apparatus employed in spinning cotton, wool, silk, and other fibrous substances.
1867. D. Spink, Eastbourne, Sussex—Imp. in steam engines.
1869. E. Haeffely, Kearsley, Lancashire—Imp. in extracting copper from its ores.
1871. C. Robertson, Edinburgh—Imp. in sights for fire arms.

Dated 26*th July*, 1861.

1877. W. Wigfall, Sheffield—Imp. in the manufacture of brushes and brooms.

Dated 27*th July*, 1861.

1881. J. B. Herbert, 8, Newman-street—Imp. in fire guards.
1883. E. P. Colquhoun and J. R. Thomson, 1, Laurence Pountney-hill—Imp. in fire-bars for furnace grates.

Dated 29*th July*, 1861.

1891. W. Melrose, 25, Kingsbridge-place, Millwall—Imp. in the construction of railway wheels.
1893. W. L. Scott, Bayswater—Imp. in preparing red, purple, and certain other dyes.

Dated 30*th July*, 1861.

1897. T. Bradford, Manchester—Imp. in washing, churning, wringing, and mangling machines.
1899. T. S. Cressey, Burton-on-Trent—Imp. in machinery used in the manufacture of casks.

Dated 31*st July*, 1861.

1905. A. Wood, Lewes—Imp. in refrigerating storehouses and in other structures in which a low temperature is continually or periodically required.

PATENTS SEALED.

[*From Gazette, August* 16*th*, 1861.]

August 15*th*.

397. R. Offord, jun.
398. F. Schafer.
401. C. Price and E. Price.
405. J. H. Brierley.
415. M. Henry.
417. E. Wilkins.
418. C. Smith.
419. J. Vavasseur.
420. T. Holstead.
422. G. Parsons.
423. W. Halse.
424. T. Richardson.
426. F. D. Blyth and J. Adair.
435. D. Evans.
439. B. Lang.
443. H. G. Prossor.
445. H. Hatchwell and S. B. Hatchwell.
446. E. T. Truman.
447. M. L. J. Lavater.
448. A. Horwood.
450. W. Walker.
454. J. E. Cook.
457. C. Stevens.
458. C. Stevens.
467. J. M. Dunlop.
472. J. Hinks.
486. J. Young.
500. W. Whalley.
504. C. Stevens.
519. R. Thompson.
531. J. Ellis, J. Stringer, and J. Bradock.
552. W. E. Newton.
615. A. Peek.
626. J. C. Coombe & J. Wright.
680. W. E. Newton.
714. T. Greenwood & A. Kinder.
794. O. Earle.
795. R. Ridley and J. Rothery.
862. H. W. Blake.
989. A. V. Newton.
1153. J. Willis.
1256. B. Hudson.
1286. H. N. Penrice.
30. A. F. Johnson.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, August* 16*th*, 1861.]

August 12*th*.

1851. T. Worth and H. Spencer.

August 13*th*.

1845. W. F. Nortcliff.

August 14*th*.

1924. J. Macintosh.

[*From Gazette, August* 20*th*, 1861.]

August 15*th*.

1875. J. Norton.
1887. W. F. Padwick.
2153. R. Romaine.

August 17*th*.

1893. F. Preston & W. McGregor.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, August* 16*th*, 1861.]

August 12*th*.

1771. W. Todd and J. Todd.
1787. W. Kennard.

August 14*th*.

1776. B. O. Stratford.
1777. J. Norton.

August 9*th*.

1760. J. Gibson.

[*From Gazette, August* 20*th*, 1861.]

August 15*th*.

1788. W. Burgess.

August 16*th*.

1847. W. E. Newton.

Journal of the Society of Arts.

FRIDAY, AUGUST 30, 1861.

GATHERING OF MEMBERS OF INSTITUTIONS AT THE CRYSTAL PALACE.

This gathering took place on Tuesday last, the 27th instant, in accordance with a Resolution passed at the last Conference.

The principal Railway Companies had arranged for excursion trains, which brought up large numbers of persons, more particularly from the northern counties. There were 8,116 persons present, of whom 7,268 were admitted on payment.

At three o'clock, Mr. B. Waterhouse Hawkins gave a lecture "On the Gorilla and other Monkeys as contrasted with Man;" it was delivered in the Concert-room, before a numerous audience. The subject, which is usually treated in a series of lectures, could only be dealt with in a comparatively cursory manner, but Mr. Hawkins, in the short time at his disposal, placed the leading points clearly before the audience, illustrating them by rapid and able sketches on the black board.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £427,000, have been attached to the Deed.

The Contractors for the Building, Messrs. Kelk and Lucas, have liberally presented each Guarantor with an ivory ticket, admitting the holder and friend to view the works every Saturday afternoon till February next.

The following arrangements, in addition to those already published, have been made in foreign countries and the Colonies:—

Grand Duchy of Mecklenburg Strelitz.

The following are the Commissioners:—Senator Ahlers, Professor Dr. Phil. Kurtze, Mr. Peters and Mr. Kapheim, having their office at New Brandenburg.

New South Wales.

Mr. Edward Hamilton has been appointed the London Commissioner for this Colony.

The Mauritius.

A Commission is being appointed here, and a Commissioner to represent it in London will shortly be named.

Hong Kong.

The following are the Commissioners:—Mr. Mercer, Colonial Secretary, *Chairman;* Mr. J. J. Mackenzie, (Messrs. Dent and Co.); Mr. J. D. Gibb (Messrs. Gibb, Livingstone, and Co.); Mr. Walkinshaw (Messrs. Turner and Co.); and Dr. Kane.

Mr. Patrick Campbell, of the Oriental Bank Corporation, will represent the Commission in London.

Suggestions for Class 30.

The Sub-Committees appointed by the exhibitors of Class 30, feeling that it is the duty of every one, each in his own branch of manufacture, to strive to the best of his ability to sustain not only his individual reputation, but by his skill, taste, ingenuity, and enterprise, to assist in supporting the character of his country, by the production of specimens rivalling those of other countries, have issued the following suggestions, which they are aware are unnecessary for many, but they think may be useful generally:—

The specialities of Class 30—namely, cabinet work, upholstery, decorative painting, relief ornament, and paperhangings—require very particularly the exercise of sound taste and judgment in the preparation of the designs; and the productions of this class will evidence, perhaps more than any other, the degree of progress in manufacturing art since the Exhibition of 1851. Reflection on the specimens which were prepared for that occasion, will afford to those who remember them valuable lessons of right and wrong—of what to study, and what to avoid.

In cabinet work especially it is most desirable to direct our attention to objects of utility; to seek to give value to these by well-considered proportion and tasteful arrangement; and to encourage our workmen to exercise their utmost skill in applying to them the perfection of finish in workmanship. The designers should be careful to construct them on sound principles; to let the construction be evident; to avoid redundancy of ornamental carving, which should never be coarse or gross, but be kept so subdued as not to interfere with the main features of the design. The mouldings should be in due proportion, and of profile suitable to the style; the delicacy and finish of these add greatly to the artistic value of a piece of furniture. It cannot be too strongly enforced that a chest of drawers, of simple, good, design and of first-rate finish, is preferable as an object for exhibition to a gaudy commode, covered with coarse and ill-assorted carving.

In decorative furniture, inlaid woods offer an elegant means of ornamentation, not by confused masses of flowers and ribbons, but by well-considered designs, purely drawn, and often consisting of simple lines, tastefully interlaced, as in some of the early Italian examples.

When brass or bronze ornaments are applied to cabinet work, they should be of an appropriate design, and well adapted to their place; not stuck on without any meaning or expression merely to make a show. They should be used moderately, and at all times be well finished.

In fine, let the designers of specimens of cabinet work for this Exhibition above all things avoid extravagances. They are generally condemned and rarely purchased. Let them also avoid that facile and vulgar style commonly called Louis Quatorze, which it is not, but is more justly denominated the rococo, a hodge-podge of graceless scrolls and *outré* shellwork. Let them aim at purity of style, of whatever period; and however important may be their work, they will find that simplicity, combined with tasteful elegance, will be most likely to lead to success.

In decorative painting and paperhangings the same rules of art may be repeated; do not attempt these said extravagances; be guided by the principles of good taste. Whatever is attempted, let it be first-rate of its kind; it is far better to do a simple thing well than to attempt an elaborate one and fail. Our imitators of woods and marbles stand pre-eminent; let them sustain their reputation by adhering to nature, not going beyond it. Grainers very

often delight in copying specimens of woods of a coarse and gaudy character, which are never employed in good cabinet work; rich, but more quiet patterns of wood are preferred.

In the preparation of the designs for paperhangings of a decorative character, purity of style is particularly to be desired, and artists should be engaged who can be depended on for this. Our French competitors exercise great judgment, good sense, and liberality in their employment of artists, whose skill and taste they make use of far more than we do. By this means they have raised the standard of excellence of their paperhangings, and obtained a very important export trade, of which by well-directed energy, we may hope to obtain a larger share. A hundred years ago our decorative paperhangings surpassed those of the French, and in some respects exceeded in artistic excellence many of the productions of this day. In the more simple designs, harmonious arrangements of colour are a most important consideration. Very pleasing decorative effects may be obtained by tasteful borders; but these should be carefully drawn, properly coloured, and well contrasted to the papers that form the panels.

In every way it is most essential to bear in mind this important precept,—That the proper application of tasteful art adds an appreciable value to all manufacturing products.

The Cape Colony.

The *Cape Monitor* says:—

At the meeting of the Cape Town Chamber of Commerce, on June 21, Mr. R. M. Ross moved, "That this Chamber tender its aid and co-operation for the purpose of the International Exhibition of 1862, to the commissioners appointed by his Excellency the Governor; and that a committee be appointed to confer with the commissioners on the mode to be adopted for securing an adequate exhibition of colonial produce, and for collecting correct information respecting the capabilities of this colony for supplying materials suitable for manufacturing purposes."

A committee, consisting of Messrs. Ebden, Watson, and Ross, was accordingly appointed. On a previous occasion we endeavoured to enforce the claims which the International Exhibition of 1862 should have upon the colony, and we have only to repeat now what we said then. The effort to represent the products and manufactures of the colony at that Exhibition should be thoroughly hearty. No half-measures will suffice. Better leave the colony unrepresented at all than do it as it was done on the former occasion. Parliament must be requested to vote means. Without money, the committee—large and influential as it is, and the sub-committees—however active they may be, will fail to do the colony justice.

New Brunswick.

The *New Brunswick Courier* says:—

The Nova Scotians are waking up to the necessity of being well represented at the great Industrial Exhibition in London in 1862. In addition to many other movements the Exhibition Commissioners have offered a prize of 400 dollars for the best Essay on "Nova Scotia and her Resources." They are to be forwarded to the Secretary of the Commissioners, accompanied by sealed notes, containing the names of the writers, on or before the 31st January.

The Nova Scotia Literary and Scientific Society offer a prize of 400 dollars for the best Essay to be sent in before the expiration of two years from the present date. The offering of this prize is owing to the patriotic liberality of a member of the Society.

The following letter has been addressed to the Editor of the *Times*:—

"Sir,—I perceive in the *Journal of the Society of Arts*, of June 28, that provision is made for an International Exhibition, to be held in London in 1872.

"May I, in your columns, state reasons in support of the two proposals I now make?

"1. That the Third Exhibition be fixed for 1868.

"2. That an International Exhibition be of sexennial recurrence in London.

"The great benefits derived from Exhibitions during the last twelve years are comparative as well as positive. They not only give to trade the stimulus of competition, and an opportunity to nations of amicable intercourse and rivalry, but they erect the landmarks of industry and commercial development. The Exhibition of 1851 served as an index to the actual state of human industry. The Exhibition of 1862 will be the pedometer of human progress. It is in this light that I could wish to see the more frequent recurrence of these great international examinations.

"It may be argued that public interest might thus be lessened. This misgiving could scarcely be justified. The Exhibition of 1851 was not detrimental to that of Paris in 1855, nor has that event damped the ardour of contributors to the Exhibition of 1862. On the 7th of August I read that 2,686 applications had been made for space by French exhibitors, against 1,700 who exhibited in 1851. Five Paris houses are preparing goods weighing 736 tons, against 730 tons, the total weight of French produce exhibited on the former occasion.

"In the present rapidity of human development ten years is too long a lapse between these international reviews. I have named six years as the period of recurrence, so as to allow France, by a similar sexennial arrangement, to reduce the intervals to three years. Think, Sir, how much will be accomplished in six years, or in three years, at the present *momentum*. The railroads of Italy will open out fields of industry almost unexplored, as well as a new and shorter route to the East. The settlement of the Roman and Venetian questions will release Austria from her present financial difficulties. The completion of the serf emancipation will enable Russia to cultivate more closely her tendencies to commercial enterprise. America will probably be relieved from the dilemma which now hampers her energies. Railways in India will render available that vast field of produce. Our new relations with China will alone furnish materials for an Exhibition, while increased facilities of transit through the world are daily, hourly, bringing within the circle of general markets, provinces and kingdoms heretofore almost unknown to trade. In six years existing political difficulties will probably be solved. In ten years they may break out afresh.

"Such are the grounds on which I rely for support for Sexennial Exhibitions. I contend, however, that the Exhibitions themselves would increase in value equally with the benefits they would diffuse. If they are of value as gauges of civilisation, how much greater would that value become if measured at different periods by the same eyes, and compared by the same intellects? Who will deny the advantages to be reaped in 1862 from the experience of Lord Granville, Mr. Dilke, and others, who took part in the Exhibition of 1851.

"Ten years is a long space in existence. It is too long to calculate on life or leisure. The sexennial plan would make the Exhibition an institution, and not, as at present, an episode. It would not depend for management wholly on the occasional labours of those who, however skilled, are still amateurs, nor for funds on the liberality of guarantors, however enterprising. By giving the Exhibition a permanent organisation we should be founding a system, a profession, a school, to discover, analyse, and expound those general laws on which reposes the prosperity of nations, to maintain and continue into future generations the traditions and provisions of those illustrious men who have applied to the human race that principle of competition heretofore confined to smaller communities.

"Nor would the central establishment, if created, find its task too easy in the intervals of International Exhibi-

tions. The system should be carried into divisions and sub-divisions. In Belgium and France Exhibitions are held, I believe, annually in each department or province. It is thus that minute industries are developed. During the sexennial intervals it would be to these minor exhibitions that the central institution should devote its energies. County exhibitions could be held in London, or members of the institution might be deputed to organize them, if invited, in counties. Exhibitions for the British Isles should be held in annual rotation in London, Edinburgh, Dublin, and other principal cities of the empire. The building in London might also be made available for colonial exhibitions and for the display of new inventions, native or foreign.

"It is needless to dwell on the advantage to accrue from a scheme embracing every branch of the human intellect, and susceptible of daily improvement, constant development, unceasing and varied combinations. If I have not addressed this letter to the Society of Arts, it is because I wish to obtain for the scheme a wider and less technical discussion. If this communication is anonymous, it is from no desire to withhold my co-operation from the preparation of a project in detail.

"I am, Sir, your obedient servant,

"A LEVANTINE COMMISSIONER FOR 1862.

"The Levant, August 19th, 1861."

Alphabetical List of the Trades of the United Kingdom.

H. M. Commissioners for the International Exhibition of 1862 have caused to be prepared an alphabetical and classified list of all the trades in the United Kingdom. This list has been compared with the applications for space already received, and is here re-produced, in order to show what trades are as yet unrepresented in the forthcoming Exhibition. Trades which have not up to this time offered to exhibit are marked with an *.

It must not be supposed that, because no artificer in any particular trade has sent in an application, therefore the objects of that industry will have no place in the building. For instance, scissors will be exhibited by cutlers, although no scissorsmaker (regarding and styling himself only as a scissorsmaker) intends to exhibit. So gold chains will be shown by goldsmiths, though no gold chain maker has yet come forward.

The last day on which applications for space can be received is the 30th of September, and H. M. Commissioners have determined strictly to entertain no fresh applications after that date. Exhibitors' productions will be placed in the following forty Classes:—

Section I.

1. Mining, Quarrying, Metallurgy, and Mineral Products.
2. Chemical Substances and Products, and Pharmaceutical Processes.
   - *a.* Exhibitors of Chemical Products.
   - *b.* Exhibitors of Medical and Pharmaceutical Processes.
3. Substances used for food.
   - *a.* Exhibitors of Agricultural Produce.
   - *b.* Fxhibitors of Drysaltery, Grocery, &c.
   - *c.* Exhibitors of Wines, Spirits, Beer and other drinks, and Tobacco.
4. Animal and Vegetable Substances used in Manufactures.
   - *a.* Exhibitors of Oils, Fats and Wax, and their Products.
   - *b.* Exhibitors of other Animal Substances used in Manufactures.
   - *c.* Exhibitors of Vegetable Substances used in Manufactures, &c.
   - *d.* Exhibitors of Perfumery.

Section II.

5. Railway Plant, including Locomotive Engines and Carriages.
6. Carriages not connected with Rail or Tram Roads.
7. Manufacturing Machines and Tools.
   - *a.* Exhibitors of Machinery employed in Spinning and Weaving.
   - *b.* Exhibitors of Machines and Tools employed in the Manufacture of Wood, Metal, &c.
8. Machinery in general.
9. Agricultural and Horticultural Machines and Implements.
10. Civil Engineering, Architectural, and Building Contrivances.
    - *a.* Exhibitors of Civil Engineering and Building Contrivances.
    - *b.* Exhibitors of Sanitary Improvements and Constructions.
    - *c.* Exhibitors of objects shown for architectural beauty.
11. Military Engineering, Armour and Accoutrements, Ordnance and Small Arms.
    - *a.* Exhibitors of Clothing and Accoutrements.
    - *b.* Exhibitors of Tents and Camp Equipages.
    - *c.* Exhibitors of Arms, Ordnance, &c.
12. Naval Architecture—Ships' Tackle.
    - *a.* Exhibitors of Ship Building for purposes of War and Commerce.
    - *b.* Exhibitors of Boat and Barge Building, and Vessels for amusement, &c.
    - *c.* Exhibitors of Ships' Tackle and Rigging.
13. Philosophical Instruments, and processes depending upon their use.
14. Photographic Apparatus and Photography.
15. Horological Instruments.
16. Musical Instruments.
17. Surgical Instruments and appliances.

Section III.

18. Cotton.
19. Flax and Hemp.
20. Silk and Velvet.
21. Woollen and Worsted, including Mixed Fabrics generally.
22. Carpets.
23. Woven, Spun, Felted, and Laid Fabrics, when shown as specimens of printing or dyeing.
24. Tapestry, Lace, and Embroidery.
25. Skins, Fur, Feathers, and Hair.
    - *a.* Exhibitors of Skins and Furs.
    - *b.* Exhibitors of Feathers.
    - *c.* Exhibitors of Manufactures from Hair.
26. Leather, including Saddlery and Harness.
    - *a.* Exhibitors of Leather.
    - *b.* Exhibitors of Saddlery, Harness, &c.
    - *c.* Exhibitors of Manufactures generally made of Leather.

27\. Articles of Clothing.
- *a.* Exhibitors of Hats and Caps.
- *b.* Exhibitors of Bonnets and General Millinery.
- *c.* Exhibitors of Hosiery, Gloves, and Clothing in general.
- *d.* Exhibitors of Boots and Shoes.

27\. Paper, Stationery, Printing, and Bookbinding.
- *a.* Exhibitors of Paper, Card, and Millboard.
- *b.* Exhibitors of Stationery.
- *c.* Exhibitors of Plate Letterpress, and other modes of Printing.

d. Exhibitors of Bookbinding.
29. Educational Works and appliances.
a. Publishers.
b. Apparatus Makers.
c. Toy and Games Manufacturers.
d. Exhibitors of specimens and illustrations of Natural History.
30. Furniture and Upholstery, including Paper Hangings. and Papier Maché.
a. Exhibitors of Furniture and Upholstery.
b. Exhibitors of Paper Hangings and General Decorations.
31. Iron and General Hardware.
a. Exhibitors of Iron and Steel Manufactures.
b. Exhibitors of Manufactures in Brass and Copper.
c. Exhibitors of Manufactures in Tin, Lead, Zinc, Pewter, and General Braziery.
32. Steel, Cutlery and Edge Tools.
a. Exhibitors of Steel Manufactures.
b. Exhibitors of Cutlery and Edge Tools.
33. Works in Precious Metals, and their imitations, and Jewellery.
34. Glass.
a. Exhibitors of Stained Glass, and Glass used in buildings.
b. Exhibitors of Glass for Household use and fancy purposes.
35. Pottery.
36. Manufactures not included in previous Classes.
a. Exhibitors of Dressing Cases, and Toilette articles.
b. Exhibitors of Trunks, and Travelling apparatus.

SECTION IV.

37. Architecture. Architectural Models and Designs.
38. Paintings in Oil and Water Colours, and Drawings.
38*a*. Art-Designs for Manufactures.
39. Sculpture, by various processes; Models, and Modelling; Die Sinking, and Intaglios; Fine Art in repoussé work.
40. Etchings and Engravings.

LIST OF TRADES.

*Accordion makers, 16
Account book manufacturers, 28 *d*
Accoutrement makers, 11 *a*
Aërated water manufacturers, 3 *c*
Agricultural engineers, 9
*Agricultural implement makers, 9
*Alabaster warehousemen, 1
*Albata refiners, 1
*Albumenized paper makers, 14
Alkali manufacturers, 2 *a*
*Alpaca manufacturers, 21
*Alpaca spinners, 21
Alum manufacturers, 2 *a*
Ammonia manufacturers, 2 *a*
Ammunition manufacturers, rifle, 11 *c*
Analytical chemists, 2 *a*
Anastatic printers, 28 *c*
Anatomical machinists, 17
*Anatomical preparers, 17
Anchor manufacturers, 12 *c*
Anchorsmiths and chain cable makers, 12 *c*
*Annatto manufacturers, 2 *a*
*Antigropelos manufacturers, 27 *d*
*Antimony refiners, 1
*Antique furniture makers, 30 *a*
Anvil and vice manufacturers, 31 *a*
*Apothecaries, 2 *b*
*Aquafortis makers, 2 *a*
Aquaria makers, 29 *d*
Archery tackle makers, 29 *c*
Architectural modellers, 10 *c*
*Armourers, 11 *c*
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*Bag pipe makers, 16
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*Baize painters, 23
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*Bandbox makers, 36 *b*
*Band spinners, 20
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*Blind spring roller makers, 31 *a*
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*Bone button makers, 4 *b*
*Bone grinders, 4 *b*
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*Hoop merchants (iron), 31 *a*
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*Horn comb makers, 4 *b*
*Horn cutters and pressers, 4 *b*
*Horn plate manufacturers, 4 *b*
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*Horn, trumpet, and bugle makers, 16
*Horn waste dealers, 4 *b*
*Horse collar makers, 26 *b*
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*Horse rug manufacturers, 21
*Horse singeing apparatus makers, 31 *a*
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*Hot pressers, 28 *a*
*Hot water apparatus makers, 31 *a*
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House painters, 30 *b*
*Hunting belts manufacturers, 27 *c*
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*Hurdle makers (wood) 4 *c*
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*Indigo extract manufacturers, 2 *a*
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*Iron bridge builders, 10 *a*
*Iron bronzes, manufacturers of, 31 *a*
*Iron bucket makers, 31 *a*
*Iron building makers, 10 *a*
*Iron cask manufacturers, 31 *a*
*Iron casters, 31 *a*
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*Iron door and room makers, 10
*Iron fence and hurdle makers, 31 *a*
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*Iron shutter makers, 10 *a*
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*Jewellers' cotton makers, 18
*Jewellers' rouge makers, 2 *a*
*Jewellers' stampers, 33
*Jews' harp makers, 31 *a*
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*Pianoforte hammer and damper cloth manufacturers, 21
*Pianoforte hammer coverers, 16
*Pianoforte hammer rail makers, 16
*Pianoforte hinge makers, 31 *b*
Pianoforte key makers, 16
Pianoforte makers, 16
*Pianoforte pin makers, 16
*Pianoforte silkers, 16
*Pianoforte small work manufacturers, 16
*Pianoforte string makers, 16
*Pianoforte turners, 16
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*Pikelet makers, 3 *b*
*Pill box makers, 28 *a*
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*Plane iron makers, 32
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*Plate case makers, 31 *a*
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*Plated goods manufacturers, 33
*Plate glass manufacturers, 34 *a*
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*Press tool makers, 7 *b*
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*Printers' block makers, 7 *b*
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*Printers' joiners, 7 *b*
*Printers' press makers, 7 *b*
*Printers' roller makers, 7 *b*
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*Printers' smiths, 7 *b*
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*Pulley block makers, 8
*Pulp cloth manufacturers, 21
*Pump bit manufacturers, 13 *a*
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*Quill and pen merchants and manufacturers, 28 *b*
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*Railway carriage axle spring makers, 5
*Railway carriage brass work manufacturers, 5
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*Railway chain and fastening manufacturers, 5
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*Railway iron work manufacturers, 5
*Railway machinery manufacturers, 5
*Railway permanent way contractors, 5
*Railway pin manufacturers, 5
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*Railway point and crossing makers, 5
Railway signal manufacturers, 5
*Railway spike manufacturers, 5
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*Railway switch makers, 5
*Railway ticket apparatus manufacturers, 7 *b*
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*Razor blade makers, 32 *b*
*Razor case makers, 36 *a*
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*Razor scale pressers, 4 *b*
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*Razor strop paste makers, 2 *a*
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*Red lead manufacturers, 2 *a*
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*Refining powder makers, 2 *a*
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*Ribbon dressers, 20
*Ribbon dyers, 23
*Ribbon finishers, 20
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*Ribbon waterers, 23
*Rib makers
*Rice cleaners, 3 *a*
*Rice dressers, 3 *a*
*Rice husk dealers, 3 *a*
*Rice merchants, 3 *a*
*Rice millers, 3 *a*
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*Rick ventilator manufacturers, 9
*Riddle and Sieve makers, 4 *c*
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*Riggers, 12 *c*
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*Rim lock makers, 31 *a*
*Ring makers, 31 *b*
Rivet makers, 31 *a*
Roasting jack makers, 31 *a*
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*Rockingham ware manufacturers, 35
Rocking horse makers, 29 *c*
*Rolled metal manufacturers, 1
*Roller clearer and ironing-cloths manufacturers, 21
*Roller coverers, 26 *c*
*Roller leather manufacturers, 26 *a*
Roller makers, 4 *c*
*Rollers and tilters, 1
*Rolling board manufacturers, 4 *c*
*Roll turners, 7 *b*
*Roman cement makers, 10 *a*
Rope, line, and twine manufacturers, 19
*Rope mat makers, 19
*Rosewood merchants, 4 *c*
*Rouge and carmine makers, 2 *a*
*Ruche manufacturers, 27 *b*
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*Rule cutters, 13
*Rule joint makers, 31 *b*
*Rule makers, 13
*Rule makers, box and ivory, 13
*Rulers, machine, 28 *c*

Home Correspondence.

INTERNATIONAL EXHIBITIONS AND FREE TRADE.

Sir,—Amongst the many advantages which have resulted from International Exhibitions, and probably the most important, is the action they have had on the public mind in promoting the relief of commerce from the incubus of fiscal impediments. To this I took occasion to allude as long since as May, 1857, when I had the honour to read a paper before the Society, "On the Brussels Congress of 1856, and its bearing on the progress of International Commerce," in which the following passage occurs, for which I cannot claim any special or occult merit, as the result therein foreshadowed or inferred could only be a question of time:—

"It is probable that the greatest continental progress in the direction of free trade may date from the International Exhibitions of 1851, in London, and of 1855, in Paris. In both, but particularly in the latter, many articles of usefulness and luxury, the produce of the skill and industry of other countries, were for the first time seen, of which native spectators had been previously permitted only a kind of traditionary knowledge. The more intimately many foreign and local visitors became acquainted with the varied contents of these temporary emporiums of manufactured property, the more they were led to inquire to what repressive policy they were to attribute the ignorance in which they had been so long kept, of the productive industry and artistic talent of surrounding nations, and whether the time had not arrived when the barriers might be removed and the ports freely opened to the products of the world. These results had been foreseen by the pioneers of these Exhibitions, and constituted a powerful inducement to make them as complete as money, influence, and ability could effect."

Little did I think, when I penned this paragraph, that this progress would have been so rapid, and that already, as one result, we should have the inestimable benefit of a commercial treaty between England and France, by which in the latter country prohibition is prohibited, heavy duties are materially reduced, and the greater part practically or absolutely abolished. But this is not all, for, as a sort of corollary, we find that a similar treaty has been entered into between France and Belgium, and that others are under diplomatic discussion between France and the new kingdom of Italy, and between France and Prussia.

Such has ever been my confidence in the canon or principle of unfettered commercial intercourse, and of the advantages of its complete adoption to the interests of social, economic, and scientific progress, that if these Exhibitions had had no other success, the conquest they have achieved over long-cherished and mischievous national prejudices, would be a sufficient reward for the labour, anxiety, and expense bestowed upon them.

I am, &c.,
THOMAS WINKWORTH.

Gresham Club, August 27, 1861.

Proceedings of Institutions.

Leek Literary and Mechanics' Institution.—The Twenty-fourth Annual Report states that the number of members are as follows:—Life, 11; honorary, 12; first and second class, 223; and one donor (W. Challinor, Esq.) The reading-room has been well attended during the past year, being supplied with newspapers, publications, &c. From the library the issue of books for the year has been 6,990, and the renewals 1,362. Few new books have been added during the past year, as the income of the Society in its present state does not permit of their purchase, the incidental expenses absorbing the greater portion of the members' subscriptions; but some donations of books have been received. In consequence of the considerable pecuniary loss that has usually attended the engagement of lecturers, &c., the Directors have not felt justified in procuring the services of any other gentleman than Mr. Walter Montgomery, who gave two readings, one miscellaneous and one of "Macbeth." The penny bank still continues to be much used, and there can be no doubt that by its means a habit of saving will be encouraged which will be of great benefit to the depositors. The number of accounts opened during the last year has been 743. The Directors exceedingly regret that the late attempt made by them to create funds to erect a suitable building, which would have been not only a credit to the Institution but an ornament to the town, did not meet with that support from the members and inhabitants of the town generally, which, from the usefulness of the object, they might reasonably have expected. The balance-sheet shows that the expenditure has been £160 6s. 6d., and that there is a balance due to the Treasurer of £10 4s.

Portsmouth and Portsea Athenæum and Mechanics' Institute.—In the thirty-fifth annual report of this Institute the Committee state, that during the past year the number of members has steadily increased, whilst the financial condition of the Society is better by at least £100 than in the preceding sessions. The lectures, which have been well received, embraced the following subjects:—Opening Soirée, interspersed with addresses, Portsmouth

Musical Association; "The Genius and Writings of Dickens," Mr. Paton; "Competitive Examinations, with hints for success in them," Mr. Stockman; "Poets of the Present Age," R. W. Matson, M.A.; "Legends and Lyrics," with musical illustrations by Mr. R. J. Wyatt, Mr. J. Slight; "Biographical Sketches of Shakspeare," Mr. Henderson; "Electricity and Magnetism," Mr. Weeks; "The Electric Telegraph," Mr. Weeks; "Biographical Romance," Rev. E. Paxton Hood, M.A.; "The Writings of Carlyle," Mr. Maxwell; "Musical Entertainment," Mr. and Mrs. G. Cooper; Two Musical Entertainments, Mr. Field; "Sayings and doings of the Anglo Saxons," Mr. G. Dawson; "Ancient Coins and Medals," Mr. Stanesby; "The Glaciers of Switzerland," Rev. E. L. Berthon, M.A.; "Chemistry," Mr. Hay. The Industrial and Fine Arts Exhibition, aided by the most generous co-operation, and having for its object the improvement and advance of the rising generation, proved a crowning success. During the brief time it continned, it was visited by nearly ten thousand persons, who were delighted with the beautiful models and other articles exhibited, and by the incidental addresses delivered by the professors of its various departments, as well as the musical performances proffered by local artists and amateurs. The funds of the Institute were improved through its means by the addition of £100. The Mutual Instruction Classes progress steadily. Mr. Stockman, to whom the thanks of the Committee are justly due, reports favourably of his department, several members of which successfully passed the examination, and new members are continually joining, in anticipation of a similar result. The singing class, conducted by Mr. H. Jones, whose energetic services the Committee gratefully acknowledge, steadily advances, and promises to form the nucleus of an instrumental music class, or of a musical association in union with the Athenæum. The Reading-room is in active operation, and the Committee are engaged in making large additions to the library. The union of the Athenæum with the Watt Institute has now been determined, and the following resolutions have been adopted:—"1. That the libraries, reading-rooms, and apparatus of both Societies be available to the members of either Society 'under the ordinary rules,' on presenting their ticket of membership." "2. That the classes of both Societies be open to the members of either society on equal terms." "3. That those members of the Watt Institute who wish to attend the usual winter course of lectures and entertainments at the Athenæum, pay towards the lecture fund of the same one shilling per quarter during the lecture session, and if they pay two such quarters' contribution at the commencement of the session, they shall have the privilege of introducing a friend to the lectures." "4. That all public notices connected with the Institution shall be headed 'The United Societies, Athenæum and Watt Institute.'" "5. That the desired co-operation may be further promoted by instituting a Central Council, to consist of five members from each Society, two from each to form a quorum." The balance-sheet shows that the receipts have amounted to £349 1s. 9d., and that there is a balance in hand of £56 0s. 10d.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, August 16th*, 1861.]

Dated 31st July, 1861.

1907. J. Rylands, T. G. Rylands, and P. Rylands, Warrington—Imp. in joining wire for telegraphic conductors and other purposes.

Dated 1st August, 1861.

1915. J. Cook, East India road, Poplar—Imp. in smoke-consuming furnaces.

Dated 3rd August, 1861.

1931. J. Henderson and J. Broadley, Saltaire, near Bradford—Imp. in means or apparatus employed in weaving.

Dated 5th August, 1861.

1939. H. C. Meyer, Hoxton—Imp. in slide valves to regulate or stop the flow of water, steam, or other fluid.

Dated 6th August, 1861.

1951. J. Turner and R. B. Dunnett, Liverpool—Imp. in stamping, endorsing, and embossing machines.
1953. J. McMorran, 33, Leicester-square—Imp. in the construction of machines for mincing meat and other substances.
1955. A. A. R. Damoiseau, Paris—Imp. in apparatus for drawing blood or other fluids from the human or animal body.
1957. A. V. Newton, 66, Chancery-lane—Imp. in the construction of reversible seats. (A com.)
1959. F. Silveston, Coventry—Certain imp. in watches.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

1945. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Imp. in the grates of reverberatory and other metallurgic furnaces. (A com.)—5th August, 1861.
1547. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—An improved odontalgic elixir. (A com.)—6th August, 1861.
1860. W. H. Richards, Newton, U.S.—A new and useful or improved combined knife, fork, and spoon, for camp or other purposes.—7th August, 1861.

[*From Gazette, August 23rd*, 1861.]

Dated 28th June, 1861.

1655. D. B. White, Newcastle-upon-Tyne—Imp. in the mechanical compression of various substances, and in apparatus employed therein.

Dated 11th July, 1861.

1748. J. Kidd, 289, Strand—Imp. in the manufacture, application, and combustion of gases, and in apparatus connected therewith.
1749. J. C. B. Salt, Birmingham—A new or improved manufacture of street plates, name plates, and other plates or surfaces having inscriptions or devices thereon.

Dated 13th July, 1861.

1765. L. George, Paris—Imp. in the method of soldering together two or more printing type letters to facilitate the work of the compositor, and in the arrangement of type cases for the same.

Dated 15th July, 1861.

1774. R. Taylor and T. Price, Bassaleg, Monmouthshire—Imp. in the manufacture of tin and terne plates.

Dated 17th July, 1861.

1801. Sir J. Hare, Knt., Hardelot Castle, Pas de Calais, France, and B. Russ, Russ'-buildings, Frogmore-street, Bristol—Imp. in heating cylinder irons or heaters to be used for pressing the seams of garments, finishing of hats, or other purposes for which heated-irons are ordinarily used, and in apparatus connected therewith.

Dated 19th July, 1861.

1823. R. A. Brooman, 166, Fleet-street—An improved method of propelling ships and other vessels by means of superheated steam. (A com.)

Dated 25th July, 1861.

1864. F. D. Blyth, 113, Fenchurch-street—Imp. in gimblets, augers, and brace bits. (A com.)

Dated 26th July, 1861.

1876. E. Sang, 2, George-street, Edinburgh—An improved apparatus for indicating the direction of objects and measuring angles.

Dated 31st July, 1861.

1903. H. Potter, Manchester—Imp. in treating or preparing textile materials and fabrics.

Dated 1st August, 1861.

1908. H. J. Walduck, Manchester—Imp. in machinery and apparatus for retarding and stopping railway engines and carriages.
1912. H. Shaw, 40, Lower Ormond-quay, Dublin—Imp. in wet gas meters.
1916. M. Pratt, Fenton Potteries, Staffordshire—An improved mode of manufacturing candle moulds.

Dated 2nd August, 1861.

1918. J. Wright, 42, Bridge-street, Blackfriars—Imp. in machinery to be used in carding cotton and other textile substances. (A com.)
1920. F. W. Turner, Swansea—Imp. in apparatus for obtaining and applying the motive power of steam.
1922. W. E. Newton, 66, Chancery-lane—Improved machinery for cleaning rice, coffee, and other grains or seeds. (A com.)

Dated 3rd August, 1861.

1924. G. Bish, High-street, Stratford, and J. Dredge, 11, Adam-street, Adelphi—Imp. in forming bends and other forms or parts of non-metallic pipes and in machinery or apparatus employed for such purposes, part of which imps. are applicable also to the formation of bends or curves in some kinds of metallic pipes.
1926. J. Cross, Manchester—Imp. in fastenings for wearing apparel and in the application thereof.

1928. C. Schinz, Offenburg, Grand Duchy of Baden—Imp. in glass furnaces.
1930. P. Habert, Bar-le Duc, France—An improved circular loom for weaving cloths of all kinds either plain or ornamented.
1934. A. Prince, 4, Trafalgar-square, Charing-cross—Imp. in palate and tooth plates for dental purposes. (A com.)

Dated 5th August, 1861.

1938. C. Burn, Delahay-street, Westminster—Imp. in the mode of fastening iron armour plates to ships' sides.
1940. S. S. Fitch, 16, Upper Seymour-street, Portman-square—An improved chest expander.
1942. J. Potter, Leeds—Certain imp. in the construction of straining pillars or posts for wire or other strained fencing, and in the apparatus to be adopted thereto for straining or tightening the wires or strands.
1944. F. Seiler, Paris—An improved mode of overleaping differential levels, applicable to canals and to other purposes.

Dated 6th August, 1861.

1946. J. A. Petit, 17, Red Lion-square—Imp. in the manufacture of watches and clocks.
1948. W. Galloway and J. Galloway, Manchester, and J. W. Wilson, Barnsley—Imp. in steam boilers and in apparatus connected therewith.
1950. R. Wappenstein, Manchester—An improved cop tube and cover for rollers used in spinning, and in apparatus for putting the tubes on the spindles.
1954. E. A. Cowper, Great George-street, Westminster—Imp. in protecting ships of war and land batteries from the effects of projectiles.
1958. P. Spence, Newton Heath, near Manchester, and J. Mellor, Manchester—Imp. in separating copper from its ores.

Dated 7th August, 1861.

1961. D. Miles, Newport, Monmouthshire—Imp. in the construction of window sashes.
1962. N. A. Lesueur, Paris, Boulevart des Amandiers, No. 78—A new system of covering for houses and other buildings and coverings.
1963. E. T. Hughes, 123, Chancery-lane—An improved wheel-barrow wagon. (A com.)
1965. W. R. Rogers, Gray's-inn-road—Improved machinery to be employed in the application of dowels to woodwork.
1966. T. G. Webb, Manchester—Imp. in the manufacture of articles of glass.

Dated 8th August, 1861.

1969. N. D. P. Maillard, Dublin—Imp. in self-acting and inexhaustible hydraulic and atmospheric motive-power engines.
1970. J. Gedge, 11, Wellington-street, Strand—An improved apparatus for beating or threshing grain. (A com.)
1971. J. Coldwell and W. Coldwell, Sheffield—Imp. in the manufacture of sheep shears.
1972. R. Jukes, Sheffield—Imp. in puddling furnaces.
1973. W. S. Hogg, Rotherhithe—Imp. in the construction of doors, gates, and shutters, principally applicable for fire-proof buildings.
1976. A. V. Newton, 66, Chancery-lane—Imp. in the construction of sewing machines. (A com.)
1977. A. V. Newton, 66, Chancery-lane—An imp. in single thread sewing machines. (A com.)
1978. L. Le Paige, Merxem, near Antwerp—Imp. in treating fatty and oily matters obtained from wash waters to deprive them of their smell.
1979. H. Kinsey, Nottingham—Imp. in steam engines and boilers.

Dated 9th August, 1861.

1980. G. Haycraft, 23, Lombard-street—Imp. in powder flasks.
1982. C. P. Moody, Corton Denham, Somersetshire—Imp. in the construction of gates.
1983. J. Hemingway, Robert-town, Yorkshire—Imp. in machinery or apparatus for working coal, ironstone, or other minerals.
1985. J. Griffin and C. Griffin, Walsall—New or improved machinery for the manufacture or cutting of corks and bungs.
1986. H. Chatwin, Birmingham—Certain imp. in the manufacture of card, needle, pin, and other cases, and in the application to such articles of a new branch of ornamental art not hitherto applied to such goods.
1987. A. V. Newton, 66, Chancery-lane—Improved machinery for sewing. (A com.)
1988. C. Lee and T. K. Mace, Birmingham—An imp. or imps. in backing or covering the backs or foundations of raised and cut pile fabrics.
1989. J. Gray, T. Kershaw, B. Crowther, and A. Dean, Manchester—Imp. in mules for spinning.
1990. R. A. Godwin, 151, Newport-street, Paradise-street, Lambeth—Imp. in pumps.

Dated 10th August, 1861.

1922. G. H. Birkbeck, 34, Southampton-buildings, Chancery-lane—Imp. in the construction of tents for military and other purposes. (A com.)
1994. H. Wilde, Manchester—Imp. in electro-magnetic telegraphs, and in apparatus connected therewith.
1996. T. Schneider, 74, Horseferry-road, Westminster, and C. E. Crawley, 17, Gracechurch-street—Imp. in inlaying wood, ivory, and other substances, and in apparatus employed therein.
1997. A. Barclay, Kilmarnock—Imp. in machinery or apparatus for raising, lowering, or moving heavy bodies.
1998. M. Wigzell, Friars-green, Exeter—A machine or apparatus for twisting ordinary nails and all other similar driving articles of a parallel or tapered form, and of a plain, fluted, grooved, or indented section throughout or in part.

Dated 12th August, 1861.

2000. H. Greaves, 22, Abingdon-street, Westminster—Imp. in apparatus to be employed for the water conveyance and delivery of coals and other materials.
2002. W. E. Gedge, 11, Wellington-street, Strand—Improved breaking apparatus for railway and other vehicles. (A com.)

Dated 13th August, 1861.

2007. J. Humpage, Balsall Heath, King's Norton, Worcestershire—A new or improved reaping and mowing machine.
2009. J. Jacob, Golden-square—Imp. in producing on porcelain and other ceramic products, on glass, venetian enamels, and on metallic surfaces, designs in colours, and in gold, silver, and other metals. (A com.)
2011. S. Andrew and S. Hornby, Staleybridge, Lancashire—Imp in machinery or apparatus for opening, cleaning, and preparing cotton and other fibrous materials.
2013. C. Binks, Gray's-inn—Improved methods of and apparatuses for treating linseed and other oils and fats.
2015. B. Cooper, Frome—Improved machinery for spinning and doubling fibrous materials.

Dated 14th August, 1861.

2017. E. A. Rippingille, Prestolee Farnsworth, near Manchester—Certain imp. in steam engines.
2019. W. E. Gedge, 11, Wellington-street, Strand—Imp. in pressing boards for pressing cloth and other fabrics. (A com.)
2023. R. A. Brooman, 166, Fleet-street—Imp. in coating wire with copper, silver, gold, or other metal or alloy in order to prevent oxidation. (A com.)
2025. T. Silvester, West Bromwich, Staffordshire—Imp. in spring balances or weighing apparatus.
2027. J. Billing, 12, Abingdon-street, Westminster—Imp. in stoves.

Patents Sealed.

[*From Gazette, August 23rd*, 1861.]

August 22nd.

463. G. Ward and J. Gaskell.
464. A. Duriez and S. Elmsley.
465. F. E. Massey.
469. L. Pohl.
470. T. Spencer.
471. J. Robinson.
477. W. F. Henson.
478. J. Leeming.
479. W. Dray.
480. E. F. Barnes.
482. G. Clark.
483. L. A. Bigelow.
490. G. Davies.
492. W. H. James.
493. R. A. Brooman.
506. J. Taylor, jun.
509. W. Weallens.
511. E. Brasier.
512. J. Bayley, J. Quarmby, and E. Burns.
514. R. Laing.
518. C. Beslay.
520. W. Rose and T. Crowder.
529. M. Henry.
537. C. Stevens.
541. S. Botturi.
564. W. E. Newton.
579. T. W. Evans, M.D.
587. R. Leake, jun., and W. Shields.
683. S. J. Wilkinson and G. F. L. Meakin.
691. J. Chalmers.
692. G. Wilson.
769. J. G. Willans.
833. W. E. Newton.
1003. W. Clark.
1058. J. Watkins.
1123. W. Rowan.
1128. E. P. Smith.
1144. W. E. Newton.
1165. J. Fitter.
1221. R. Hornsby, jun.
1282. J. Sidebottom.
1426. G. Baker.
1538. S. Grant.
1567. W. E. Newton.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, August 23rd*, 1861.]

August 20th.

1903. M. Benson.
1914. A. Royle.

August 21st.

1909. F. Puls.
1910. F. Puls.

[*From Gazette, August 27th*, 1861.]

August 23rd.

1242. W. Esson.
1945. A. V. Newton.
2175. J. Morrison.

August 24th.

1950. J. Ireland.
1954. J. D. Brabazon.
1987. W. Warne.
2001. G. T. Bousfield.
2076. R. Frost and A. Rigg.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, August 23rd*, 1861.]

August 21st.

1872. John Gedge.

[*From Gazette, August 27th*, 1861.]

August 22nd.

1851. J. Norton.

August 24th.

1865. J. H. Tuck.
1173. W. Smith and T. Phillips.

Journal of the Society of Arts.

FRIDAY, SEPTEMBER 6, 1861.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £427,400, have been attached to the Deed.

The following arrangements, in addition to those already published, have been made in foreign countries and the colonies:—

Norway.

Mr. Emil Tidemand, of the Royal Norwegian Department for the Interior, Knight of the order of St. Olaf, has been definitely appointed Commissioner, and will be sent to London to assist in the arrangements, and to attend to the interests of Norwegian exhibitors.

St. Vincent.

The following are the Commissioners:—The Hon. Charles Douglas Stewart; James Mayer Grant, Esq.; David Cowie, Esq.; Robert Checkley, Esq., M.D.; and George Hammond Hawtayne, Esq.

St. Helena.

A Commission has also been appointed, consisting of a Committee of the "Island Society," of which Mr. George Moss is President. Mr. N. Solomon has been nominated Commissioner in England.

It has been intimated to her Majesty's Commissioners for the Exhibition of 1862, that the period fixed upon by Austria for the Exhibition of Works of Art, will date from Heinrich Füger's admission to the Academy of Vienna (1784).

The Paris correspondent of the *Times* says:—

"The French Imperial Commission for the Universal Exhibition of 1862 publishes a note, dated the 2nd inst., in which it declares that the operations of the juries of the Seine and the other departments are approaching their conclusion. The number of admissions proposed by them amount at present to upwards of 7,000. If it be borne in mind, observes the notice, that the whole space attributed to France is 11,160 square metres, of which two-thirds must be deducted for the walking space reserved to the public, it will be found that each exhibitor can obtain only half a square metre. In 1851, 1,700 French exhibitors were allowed 9,300 square metres, of which 3,100 were positively occupied by goods, giving nearly five square metres for each exhibitor. The Imperial Commission consequently will find itself compelled by the force of circumstances to reduce considerably the number of admissions, if the application for additional space which has been made to the British Commissioners should not receive, before the 15th instant, a favourable reply. The Imperial Commission will be shortly prepared to give a list of names of agents who can fit up the stalls for the French exhibitors or to represent them during the Exhibition, but without undertaking any responsibility as to the conduct of these agents. The rest of the notice is occupied with an account of the decisions come to by the British Commissioners relative to the recompenses to be given and to the formation of the national jury which will be charged to award them."

NOTICE TO INSTITUTIONS.

A copy of the Programme of Examinations for 1862, with the Appendix, has been forwarded to each Institution in Union. Additional copies may be obtained on application to the Secretary of the Society of Arts.

A copy of Miss Nightingale's "Notes on Nursing," referred to in Mr. Chadwick's letter (page 712), has also been forwarded to each Institution.

THE BRITISH COLONIES AND THE INTERNATIONAL EXHIBITION OF 1862.

By P. L. Simmonds.

No. III.—The West Indian Colonies.

Coming under the popular designation of the West Indies, Great Britain has seventeen colonial dependencies, namely:—Jamaica, Turk's and Caicos Islands, Honduras, Bahamas, Barbados, St. Vincent, Grenada, Tobago, St. Lucia, Antigua, Montserrat, St. Christophers, Nevis, Virgin Islands, Dominica, British Guiana, and Trinidad. Judging from present appearances, only a very few of these will be represented by contributions of their products to the International Exhibition. I cannot but regret this apathy and indifference on the part of the West Indies, because I have a personal knowledge of many of the islands, and have long laboured to advance the general interests of Barbados, Jamaica, and others. It is true some of them have suffered from want of labour, but generally they have suffered more from attention being exclusively given to one or two main staples. With abundance of luxuriant soil and the advantages of a tropical climate, one great staple product after another has been abandoned, and cotton, coffee, indigo, and other remunerative articles have passed away to the East. At a time when fibrous substances, paper materials, woods, &c., are in increased demand, many of these possessions could have astonished our manufacturers and merchants with abundant and suitable supplies had they been so inclined.

If we look at the progress of the principal West Indian Colonies in the past ten years, we shall find that it can make no comparison with that of the African, Australian, or American Colonies.

In 1851 the exports from the British West India Colonies and Demerara consisted of 3,048,958 cwts. of sugar, 3,942,013 gallons of rum, and 5,731,640 lbs. of coffee. In 1859 the exports were 3,127,705 cwts. of sugar, 5,9913,784 gallons of rum, and 2,573,309 lbs. of coffee. Thus, while the sugar produce is about the same, the rum has increased about 2,000,000 gallons, and the coffee has declined fully one-half. The other West Indian exports comprise the following articles, and it is to these we should like to see greater attention given, as both yielding profitable returns, and varying the attention and labour of producers. Pine apples in large numbers come from the Bahamas, a trade only commenced by small imports at Liverpool in 1842, but the trade now chiefly centres in London, and ten or twelve vessels arrive during each season freighted with this fruit, each cargo comprising from 20,000 to 40,000 pine apples. These meet with a ready sale, owing to the large demand for preserves and confectionary purposes. The culture in the Bahamas has been much improved, and better prices are obtained by the growers, owing to the competition, for the British and American markets.

The trade is carried on by sailing vessels, as steamers were found to heat and ripen the fruit too quickly.

About one million cocoa-nuts are shipped, but what is this small number compared to what might be grown? Coir and oil, manufactured from the cocoa-nut, are absolutely imported into the West India colonies. Barbados ships about 126,000 lbs. of superior aloes, a profitable small crop. The other West Indian exports comprise 16,210 cwts. of arrow-root, chiefly from St. Vincent and Barbados, being nearly two-thirds of our whole import. Although the manufacture of this starch is now extensively carried on at Natal, Sierra Leone, Penang, and other quarters, it cannot compete in quality with the true Maranta arrow-root of Bermuda and St. Vincent. The exports of West Indian cocoa amounted to 4,211,185 lbs., chiefly from Trinidad, Grenada, and St. Lucia; the quantity taken for consumption here is about 3,000,000 to 3,500,000 lbs. per annum. The exports of pimento from Jamaica were 15,280 cwts.; but why are not the aromatic leaves utilised, and an oil distilled from them and the berries?

Ginger is another spice or condiment which the West India colonies export, to the amount of 5,000 cwts. Cotton is beginning again to appear more frequently in the exports, reaching now in the aggregate about 1,500 cwts. To these have to be added 10,000 or 12,000 tons of logwood and fustic, 2,471 cwts. of hides, about 5,000 lbs. of tortoise-shell, and 207,450 lbs. of common sponge from the Bahamas. But even taking the whole of these miscellaneous articles of export, what a small proportion do they bear to the abundant natural productions of the islands, and to those which might be so largely extended by culture, whether for food, for the arts, or manufactures.

Passing on from this preliminary survey of their export trade, let us see what are the prospects, as far as yet known, of our West Indian colonies, competing with other countries in an exhibition of their productions in London next year. With the exception of such colonies as Demarara, Trinidad, and Jamaica, which are expected to become extensive contributors, very little will, I fear, be accomplished by the lesser colonies. The people of these islands take no interest in any pursuits that are not immediately connected with the production of sugar. This is much to be regretted, because the French colonies of Martinique, Guadaloupe, and Guiana are likely to be well represented. At the Paris Exhibition their varied products attracted much attention, and have been collected and retained in a permanent Colonial Exposition at the Palace of Industry. The absence of a good colonial museum in this country, where the products of our fifty colonies, scattered over all climates, could be seen and examined, is much to be regretted.

In 1851, out of 5,500 feet allotted for the West Indian Colonies, only 742 feet were occupied. British Guiana and Trinidad were well represented, and a few odds and ends were sent from Barbados, Bahamas, Jamaica, and St. Kitts, but no general interest was taken in the International Exhibition. In 1855, at Paris, through the exertions of the Royal Society of Arts, Jamaica was well represented by about 45 exhibitors, the collection occupying about 483 feet of space. British Guiana occupied 357 feet, and there were 95 exhibitors. The only other West Indian Colonies that took part in the Paris Exhibition were Barbados, 3 exhibitors, and Bahamas, 5.

In St. Lucia, my friend Mr. Breen, the Governor (well-known as the historian of the colony), informs me in a private letter, that he has published in the "Official Gazette" of the island the various circulars and documents received from H.M. Commissioners and the Colonial Office, and also a notice, inviting such of the inhabitants as might be desirous of becoming contributors, to notify their intention to the Executive, giving a description of the articles which they propose to send for exhibition. To this invitation no response has yet been made. The island is in a flourishing condition, and the planters and inhabitants seem intent on nothing but making money. Some little attention given to other products than sugar might not, however, be out of place.

Governor Kortright, in a dispatch to His Excellency Governor Hincks, the Governor-General of the Windward Islands, states that the House of Assembly of Grenada, acting on his suggestion, has appointed Messrs. Davison, Purcell, Alex. Hall, Sinclair, Steeles, and Dr. Wells, to be the Commissioners for that island.

The following gentlemen have been appointed a Commission for the purpose of communicating with her Majesty's Commissioners, and forming a collection of objects for exhibition from Trinidad:—His Excellency the Governor (R. W. Keate, Esq.), the Hon. C. W. Warner, C.B., the Hon. D. Mitchell, Herman Crüger, Esq. (Government Botanist), Charles Feez, Esq., and Sylvester Devenish, Esq., the latter gentleman to act as secretary. The agent to act for the colony in England has not yet been selected, but application for space to the amount of 200 superficial feet has been made.

The Legislature of British Guiana has already voted the sum of £1,000, and will probably grant more. Mr. Wodehouse having relinquished the government of this colony, the provisional administration thereof has devolved upon Wm. Walker, Esq., as Lieutenant-Governor, who has taken a great interest in the due representation of the Colony. To the Royal Agricultural and Commercial Society of British Guiana has been delegated the management of all affairs connected with the Local Exhibition of 1861, and the London Exhibition of 1862. It is the intention of the Society to forward to London as large and complete a collection of the productions of the colony as the time and means at their disposal will permit, and which it is anticipated will not be inferior to the contribution forwarded to Paris, in 1855, that gained for British Guiana the gold medal of honour. The preliminary local show was to be held in Georgetown, in the past month (August), and the articles selected from this show would be transmitted to London early next year.

A few years ago, there was held at Georgetown a public exhibition of live stock, ground provisions, coffee, sugar, seeds, barks, woods, cotton, plantain fibre, vegetable oils, and other articles grown or manufactured in the colony. Of the things then exhibited, many (such as cotton and other fibrous substances, woods, oils, &c.) are in great demand in England, whilst others are constantly needed for local consumption.

Premiums were given, through the liberality of His Excellency the Governor and the Legislature, to those who sent the best specimens of colonial productions or manufacture. A considerable number of the things thus brought together were afterwards forwarded to the Paris Exhibition in 1855, where they created no small interest, and led to much inquiry concerning this colony, its people, and its capabilities of furnishing many valuable articles sought after by those living in other parts of the world.

Local exhibitions have been found to work well in Europe and also in other of the West India Colonies, in some of which, I believe, such collections of native produce and manufacture are presented to the public view every year.

A powerful stimulus has been given by them to industry, skill, and forethought, that has promoted moral improvement as well as material prosperity, and it is believed that such a means of social progress will prove as beneficial in Demerara as in other lands.

In the close of last year a general committee of nearly 100 of the most intelligent and influential colonists was appointed for the purpose of promoting the interests of the Local Exhibition, intended to be held, and a Museum, and also to aid the colonial collection for the International Exhibition in London. Special sub-committees of those best acquainted with the several subjects were formed; for saccharine productions and articles of food prepared for exportation; for fibrous substances; for materials used in chemical arts and in medicine; wood for building and other purposes; for natural history; for

Indian manufactures; for live stock, agricultural implements, &c., and for vegetables, fruits, and flowers.

In the address of the Committee of Correspondence of the Royal Agricultural and Commercial Society of British Guiana, they state that they conceive that the time had arrived when they might with propriety appeal to the survivors of the General Committee, through whose exertions in 1854-55 the colony was so worthily represented by specimens of its products at the Paris Exhibition, and to all others who take a practical interest in the promotion of its prosperity, for their support to an endeavour again to bring its value and importance to the notice of the intelligent and enterprising capitalists of Europe.

If, on the one hand, it may be frankly admitted that little direct benefit, in a commercial point of view, seems to have resulted from previous efforts of this description, it should, on the other hand, be remembered that the variety and magnitude of the resources of the colony, then almost for the first time brought in a tangible shape under the observation of the curious and scientific, elicited the strongest expressions of surprise, and stimulated inquiry as to the possibility of turning them to account. It is manifestly only by perseverance in the course upon which we have thus entered, that final success can be hoped for. Eager as are the manufacturers at home to be put in possession of new staples, and to have the command of other raw materials, they cannot be expected, at such a distance from these localities, to undertake the entire risk of the experiment. To place such products in the markets must devolve on others, and once so placed there is little room to fear that anything intrinsically valuable will fail of receiving a fair share of attention or of being tested to the utmost as to its applicability to useful purposes.

It is undeniable that there is a large proportion of labour-power existing in this colony which does not yield commensurate returns; it is equally so that, apart from the great staples on which the welfare of the colony must no doubt mainly depend, there are multifarious products now neglected or wasted which would afford remunerative employment to by no means excessive exertion. Take, for example, the bark and seeds of the greenheart; the starch-producing roots; plants yielding tannin or dye stuffs, or vegetable oils; cotton, coffee, ginger, and peppers; the improved preparation of charcoal, rendering available the pyroligneous acid and other products now lost; not to speak of plantain fibre, which the possession of the simplest machinery would enable the small proprietor easily to convert into an auxiliary source of profit of no small importance; and we see at once neglected, yet obvious, means of comparative wealth to the rural population and of augmented benefit to the general interest. But for the accomplishment of all this, or even of any portion of it, an organized agency is wanting, and it is that which the Committee of Correspondence propose, through the medium of the General Committee, to supply.

By bringing home to the convictions of the peasantry the benefits derivable from regular attention to the culture of the vegetable treasures which nature places spontaneously, or nearly so, within their reach, and by providing them with a market for the produce of such labour, the strongest possible influence will be brought to bear upon them for good, and the most powerful inducement to discharge their duties as members of the community. There may be many who will doubt the possibility of success; there are none who ought not to desire it, and few who could not, in some way or to some extent, assist in its attainment.

As on former occasions, a list of objects, to which it is deemed desirable that attention should be especially directed, is appended for the guidance of those who are disposed to render their assistance.

In the first division of raw materials and produce, specimens in duplicate, and where possible in triplicate, have been obtained.

The Committee of Correspondence add that they cannot, perhaps, more appropriately close their present address than by quoting some passages from their original prospectus of 1854.

"The Executive Committee are impressed with the belief that there will not be wanting suitable responses to an invitation to the artisans, small freeholders, and farmers, and even to the labourers of the colony, to produce at a Public Exhibition samples of the results of extra care and diligence bestowed upon the raising of stock, the cultivation of fruits, vegetables, and flowers, and the practice of the mechanical arts. In order to afford every reasonable encouragement to those classes to do this, the Executive Committee propose that suitable prizes, a specification of which will be published as soon as practicable, shall be awarded to the producers of the best articles, whether contributed for the London Exhibition or the Museum, or sent for the Local Exhibition alone.

"It is obvious, that as what can be done well once can be always as well done, if proper energy be manifested, there will be a local demand created for the improved specimens of the results of labour and skill applied in the branches to which allusion has been made. But more than this, the Executive Committee, being in correspondence with the Society of Arts in London, propose to give such successful competitors as may bring forward articles capable of being preserved sufficiently long, the additional advantage of transmitting their specimens to London, thus opening up a prospect of a wider field and more extensive market, while contributing to augment the variety of exportable products of this colony.

"The Executive Committee desire it to be distinctly understood, that while they have specially in view the object of affording a wholesome stimulus to the industry and skill of the humbler classes of society, and while they indicate certain kinds of objects as being of more peculiar and general interest, individuals of all classes will be alike welcomed to the proposed competition, nor will any article be excluded from the benefits of the scheme they have undertaken to carry out.

"They have but one aim: it is to promote the wise and enlightened intentions of the Legislature by augmenting the general mass of wealth, in encouraging the humblest classes to come forward and shew what can be done by mutual co-operation for a common object, unimportant, and even trifling, as some of the efforts may appear to be if regarded individually. The Executive Committee are convinced that the object can be attained; but while no effort of theirs shall be wanting to achieve it, the issue rests not with them alone; they must be supported by the good feeling, intelligence, and, they will add, patriotism, of the classes whose benefit they more especially seek, or success, which with such support would be certain, will not be secured."

At a meeting of the Royal Agricultural and Commercial Society of British Guiana, held on the 2nd April, it was unanimously carried that J.T. Gilbert, Esq., Vice-President, and Sir William H. Holmes, as Secretary, should be named to represent the Colony as delegates at the coming Exhibition in London, in 1862, and that his Excellency the Governor be respectfully requested to communicate this appointment to the Right Hon. the Colonial Secretary of State and to the Exhibition authorities. Both these gentlemen have arrived in England. It is not certain whether Mr. Gilbert's professional avocations as a barrister in the Colony, will permit of his being present at the Exhibition; but Sir W. H. Holmes, who so efficiently represented the Colony in Paris during the Exhibition of 1855, hopes to obtain an extension of his leave of absence to enable him to do so.

In a letter from the Council of the Royal Society of Arts, Jamaica, to his Excellency Governor Darling, dated 13th August, 1860, they state that "The Committee which was appointed for the proposed International Exhibition depended very much for their course of action on the information they should receive from their lamented coadjutor, the Hon. Mr. Wilkinson, on his expected return to this island. That gentleman undertook, while in

London, to make himself master of the whole subject, and on his return to communicate with the Council as to what would be the best means of promoting the interests of the colony in the said Exhibition. The unfortunate demise of this worthy gentleman has frustrated, in the mean time, the hopes of the Council in this respect.

"I am requested to assure your Excellency that the Council are feelingly alive to the good that will probably result to Jamaica from an abundant illustration of the resources of this island in the said Exhibition, by an accumulation of specimens of the natural and artificial products of the country. The Council have determined to use every exertion in their power to render this department entirely and in every way creditable to this island, if the means are afforded them by the Island Legislature. They will allow nothing to interfere with their transmission to the International Exhibition of such an amount of island products as shall win for the Colony similar honours as were achieved for her by the Great Paris Exhibition of 1855."

His Excellency Governor Darling, in a despatch to the Secretary of State for the Colonies, dated July 6, announces that he has appointed the Council of the Royal Society of Arts of Jamaica to be the Commission or central authority for that colony, for the International Exhibition. His Excellency adds, however, that he is afraid little will be done in forwarding the necessary arrangements, until it shall be ascertained whether the Legislature will sanction any and what amount of money for the purpose.

In St. Vincent, a Commission of five gentlemen has been appointed, according to the following official announcement:—"Colonial Secretary's Office, St. Vincent, 25th July, 1861.—His Honour the Administrator of the Government has this day been pleased to appoint the Honourables Charles Douglas Stewart, James Mayer Grant, David Cowie, and Robert Checkley, M.D., and George Hammond Hawtayne, Esquires, to be Commissioners for Saint Vincent, for making and carrying out arrangements in connection with the International Exhibition of 1862, in accordance with the Resolution of the Legislature in that behalf.—Bouverie Alleyne, Colonial Secretary."

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The Thirty-first Annual Meeting of this Association commenced on Wednesday, the 4th of September, at Manchester, under the direction of the following officers:—

President.—William Fairbairn, Esq., LL.D., C.E., F.R.S.

Vice-Presidents.—The Earl of Ellesmere, F.R.G.S.; the Lord Stanley, M.P., D.C.L., F.R.G.S.; the Lord Bishop of Manchester, D.D., F.R.S., F.G.S.; Sir Philip de Malpas Grey Egerton, Bart., M.P., F.R.S., F.G.S.; Sir Benjamin Heywood, Bart., F.R.S.; Thomas Bazley, Esq., M.P.; James Aspinall Turner, Esq., M.P.; James Prescott Joule, Esq., LL.D., F.R.S., President of the Literary and Philosophical Society of Manchester; Joseph Whitworth, Esq., F.R.S., M. Inst. C.E.

General Secretary.—Rev. Robert Walker, M.A., F.R.S., Professor of Experimental Philosophy, Oxford.

Assistant-General Secretary.—John Phillips, Esq., M.A., LL.D., F.R.S., F.G.S., Professor of Geology, Oxford.

General Treasurer.—John Taylor, Esq., F.R.S.

Local Secretaries.—Robert Dukinfield Darbishire, Esq., B.A., F.G.S., 21, Brown-street, Manchester; Alfred Neild, Esq., Mayfield, Manchester; Arthur Ransome, Esq., M.A., St. Peter's-square, Manchester; Professor Henry Enfield Roscoe, B.A., Owens College, Manchester.

Local Treasurer.—Robert Philips Greg, Esq., F.G.S., Manchester.

The Council met at ten o'clock in the morning, and at one o'clock the General Committee held its first meeting in the Town-hall, for the election of sectional officers and the despatch of business.

The First General Meeting of the Association was held in the Free Trade-hall, at Eight p.m., when the President, Lord Wrottesley, F.R.S., resigned the chair, and William Fairbairn, Esq., LL.D., F.R.S., assumed the Presidency, and delivered his address, in the course of which he said:—

"The largest developments of chemistry, have been in connection with the useful arts. What would now be the condition of calico-printing, bleaching, dyeing, and even agriculture itself, if they had been deprived of the aid of theoretic chemistry?

"For example: Aniline—first discovered in coal tar by Dr. Hofmann, who has so admirably developed its properties—is now most extensively used as the basis of red, blue, violet, and green dyes. This important discovery will probably in a few years render this country independent of the world for dye stuffs; and it is more than probable that England, instead of drawing her dye stuffs from foreign countries, may herself become the centre from which all the world will be supplied.

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"In noticing the more recent discoveries in this important science, I must not pass over in silence the valuable light which Chemistry has thrown upon the composition of iron and steel. Although Despretz demonstrated many years ago that iron would combine with nitrogen, yet it was not until 1857 that Mr. C. Binks proved that nitrogen was an essential element of steel, and more recently M. Carou and M. Fremy have further elucidated this subject; the former showing that cyanogen, or cyanide of ammonium, is the essential element which converts wrought iron into steel; the latter combining iron with nitrogen through the medium of ammonia, and then converting it into steel by bringing it at the proper temperature into contact with common coal-gas. There is little doubt that in a few years these discoveries will enable Sheffield manufacturers to replace their present uncertain, cumbrous, and expensive process, by a method at once simple and inexpensive, and so completely under control as to admit of any required degree of conversion being obtained with absolute certainty. Mr. Crace Calvert also has proved that cast-iron contains nitrogen, and has shown that it is a definite compound of carbon and iron mixed with various proportions of metallic iron, according to its nature.

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"Having glanced, however imperfectly, at some of the most important branches of science which engage the attention of members of this Association, I would now invite attention to the mechanical sciences with which I am more familiarly acquainted. They may be divided into theoretical mechanics and dynamics, comprising the conditions of equilibrium and the laws of motion; and applied mechanics, relating to the construction of machines. I have already observed that practice and theory are twin sisters, and must work together to ensure a steady progress in mechanical art. Let us then maintain this union as the best and safest basis of national progress, and, moreover, let us recognise it as one of the distinctive aims of the annual reunions of this Association."

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"Viewing the past, with a knowledge of the present and a prospect of the future, it is difficult to estimate sufficiently the benefits that have been conferred by the apcation of mechanical science to the purposes of navigation. Power, speed, and certainty of action, have been attained on the most gigantic scale. The celerity with which a modern steamer, with a thousand tons of merchandise, and some hundreds of human beings on board, cleaves the water and pursues her course, far surpasses the most sanguine expectations of a quarter of a century ago, and, indeed, almost rivals the speed of the locomotive itself. Previous to 1812, our intercourse with foreign countries and with our colonial possessions depended entirely upon

the state of the weather. It was only in favourable seasons that a passage was open, and we had often to wait days, or even a week, before Dublin could be reached from Holyhead. Now, this distance of sixty three miles is accomplished in all weathers in little more than three hours. The passage to America used to occupy six weeks or two months; now it is accomplished in eight or nine days. The passage round the Cape to India is reduced from nearly half a year to less than a third of that time, whilst that country may be reached by the overland route in less than a month. These are a few of the benefits derived from steam navigation, and as it is yet far from perfect, we may reasonably calculate on still greater advantages in our intercourse with distant nations.

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"Previously to the inventions of Henry Cort, the manufacture of wrought iron was of the most crude and primitive description. A hearth and a pair of bellows was all that was employed. But since the introduction of puddling the iron-masters have increased the production to an extraordinary extent, down to the present time, when processes for the direct conversion of wrought iron on a large scale are being attempted. A consecutive series of chemical researches into the different processes, from the calcining of the ore to the production of the bar, carried on by Dr. Percy and others, has led to a revolution in the manufacture of iron; and although it is at the present moment in a state of transition, it nevertheless requires no very great discernment to perceive that steel and iron of any required tenacity will be made in the same furnace, with a facility and certainty never before attained. This has been effected, to some extent, by improvements in puddling; but the process of Mr. Bessemer,—first made known at the meeting of this Association at Cheltenham,—affords the highest promise of certainty and perfection in the operation of converting the melted pig direct into steel or iron, and is likely to lead to the most important developments in this manufacture. These improvements in the production of the material must, in their turn, stimulate its application on a larger scale and lead to new constructions."

"In iron ship-building an immense field is opening before us. Our wooden walls have, to all appearance, seen their last days; and as one of the early pioneers in iron construction, as applied to shipbuilding, I am highly gratified to witness a change of opinion that augurs well for the security of the liberties of the country. From the commencement of iron shipbuilding in 1830 to the present time, there could be only one opinion amongst those best acquainted with the subject, namely, that iron must eventually supersede timber in every form of naval construction. The large ocean steamers, the *Himalaya*, the *Persia*, and the *Great Eastern*, abundantly show what can be done with iron, and we have only to look at the new system of casing ships with armour plates, to be convinced that we can no longer build wooden vessels of war with safety to our naval superiority and the best interests of the country. I give no opinion as to the details of the reconstruction of the navy—that is reserved for another place,—but I may state that I am fully persuaded that the whole of our ships of war must be rebuilt of iron, and defended with iron armour calculated to resist projectiles of the heaviest description at high velocities.

"In the early stages of iron shipbuilding, I believe I was the first to show, by a long series of experiments, the superiority of wrought-iron over every other description of material in security and strength, when judiciously applied, in the construction of ships of every class. Other considerations, however, affect the question of vessels of war; and although numerous experiments were made, yet none of the targets were on a scale sufficient to resist more than a six-pounder shot. It was reserved for our scientific neighbours, the French, to introduce thick iron plates as a defensive armour for ships.

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"We have already seen a new era in the history of the construction of bridges, resulting from the use of iron; and we have only to examine those of the tubular form over the Conway and Menai Straits to be convinced of the durability, strength, and lightness of tubular constructions applied to the support of railways or common roads, in spans which, ten years ago, were considered beyond the reach of human skill. When it is considered that stone bridges do not exceed one hundred and fifty feet in span, nor cast-iron bridges two hundred and fifty feet, we can estimate the progress which has been made in crossing rivers four hundred or five hundred feet in width, without any support at the middle of the stream. Even spans greatly in excess of this may be bridged over with safety, provided we do not exceed eighteen hundred to two thousand feet, when the structure would be destroyed by its own weight.

"It is to the exactitude and accuracy of our machine tools that our machinery of the present time owes its smoothness of motion and certainty of action. When I first entered this city, the whole of the machinery was executed by hand. There were neither planing, slotting, nor shaping machines, and with the exception of very imperfect lathes and a few drills, the preparatory operations of construction were effected entirely by the hands of the workmen. Now everything is done by machine tools, with a degree of accuracy which the unaided hand could never accomplish. The automaton, or self-acting machine tool, has within itself an almost creative power; in fact, so great are its powers of adaptation, that there is no operation of the human hand that it does not imitate. For many of these improvements the country is indebted to the genius of our townsmen, Mr. Richard Roberts and Mr. Joseph Whitworth.

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"Amongst the changes which have largely contributed to the comfort and enjoyment of life, are the improvements in the sanitary condition of towns. These belong, probably, to the province of social, rather than mechanical science; but I cannot omit to notice some of the great works that have of late years been constructed for the supply of water and for the drainage of towns. In former days, ten gallons of water to each person per day was considered an ample allowance. Now thirty gallons is much nearer the rate of consumption."

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"The greatest undertaking of this kind, yet accomplished, is that by which the pure waters of Loch Katrine are distributed to the city of Glasgow. This work, recently completed by Mr. Bateman, who was also the constructor of the water-works of this city, is of the most gigantic character, the water being conveyed in a covered tunnel a distance of twenty-miles, through an almost impassable country, to the service reservoir, about eight miles from Glasgow. By this means forty million gallons of water per day are conveyed through the hills which flank Ben Lomond, and after traversing the sides of Loch Chon and Loch Aird, are finally discharged into the Mugdock basin, where the water is impounded for distribution.

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"Irrespective of inland and international telegraphy, a new system of communication has been introduced by Professor Wheatstone, whereby intercourse can be carried on between private families, public offices, and the works of merchants and manufacturers. This application of electric currents cannot be too highly appreciated, from its great efficiency and comparatively small expense. To show to what an extent this improvement has been carried, I may state that one thousand wires, in a perfect state of insulation, may be formed into a rope not exceeding half an inch in diameter.

"I must not sit down without directing attention to a subject of deep importance to all classes, namely, the amount of protection the inventors should receive from the laws of the country. It is the opinion of many that patent laws are injurious rather than beneficial, and that

no legal protection of this kind ought to be granted; in fact, that a free trade in inventions, as in everything else, should be established. I confess I am not of that opinion. Doubtless there are abuses in the working of the patent law as it at present exists, and protection is often granted to pirates and impostors, to the detriment of real inventors. This, however, does not contravene the principle of protection, but rather calls for reform and amendment. It is asserted by those who have done the least to benefit their country by inventions, that a monopoly is injurious, and that if the patent laws are defended it should be—not on the ground of their benefit to the inventor—but on that of their utility to the nation. I believe this to be a dangerous doctrine, and I hope it will never be acted upon. I cannot see the right of the nation to appropriate the labours of a lifetime, without awarding any remuneration. The nation, in this case, receive a benefit; and assuredly the labourer is worthy of his hire. I am no friend of monopoly, but neither am I a friend to injustice; and I think that before the public are benefited by an invention, the inventor should be rewarded either by a fourteen years' monopoly, or in some other way. Our patent laws are defective, so far as they protect pretended inventions; but they are essential to the best interests of the State in stimulating the exertions of a class of eminent men, such as Arkwright, Watt, and Crompton, whose inventions have entailed upon all countries invaluable benefits, and have done honour to the human race. To this Association is committed the task of correcting the abuses of the present system, and establishing such legal provisions as shall deal out equal justice to the inventor and the nation at large.

"I must not forget that we owe very much to an entirely new and most attractive method of diffusing knowledge, admirably exemplified in the Great Exhibition of 1851, and its successors in France, Ireland, and America. Most of us remember the gems of art which were accumulated in this city during the summer of 1857, and the wonderful results they produced on all classes of the community. The improvement of taste, and the increase of practical knowledge which followed these exhibitions, has been deeply felt; and hence the prospects which are now opening before us in regard to the Exhibition of the next year cannot be too highly appreciated. That Exhibition will embrace the whole circle of the sciences, and is likely to elevate the general culture of the public to a higher standard than we have ever before attained. There will be unfolded almost every known production of Art, every ingenious contrivance in machinery, and the results of discoveries in science from the earliest period. The Fine Arts, which constituted no part of the Exhibition of 1851, and which were only partially represented at Paris and Dublin, wil be illustrated by new creations from the most distinguished masters of the modern school. Looking forwards, I venture to hope for a great success and a further development of the principle advocated by this Association, the union of science and art."

On Thursday (yesterday), the Sectional Meetings commenced. The sections are the following:—

A.—Mathematical and Physical Science.—*President:* G. B. Airy, Esq., D.C.L., F.R.S., Astronomer Royal.

B.—Chemical Science.—*President:* W. A. Miller, M.D., F.R.S., Professor of Chemistry, King's College, London.

C. — Geology. — *President:* Sir R. I. Murchison, G.C.St.S., D.C.L., F.R.S., Director-General of the Geological Survey of the United Kingdom.

D.—Zoology and Botany.—*President:* C. C. Babington, Esq., M.A., F.R.S., Professor of Botany, Cambridge.

D.—Sub-Section Physiology.

E.—Geograhy and Ethnology. — *President:* John Craufurd, Esq., F.R.S., President of the Ethnological Society.

F.—Economic Science and Statistics.—*President:* William Newmarch, Esq., F.R.S.

G.—Mechanical Science.—*President:* John F. Bateman, Esq., C.E., F.R.S.

FLAX AND ITS PRODUCTS IN IRELAND.

By Wm. Charley, J.P., Seymour-hill, near Belfast.

Letter XVIII.

Glancing back over the history of the flax plant and its products in Ireland, and surveying the present position of this branch of industry as to progress, in comparison with other textile fabrics of the British Isles, one is struck with the trifling reduction in the cost of the raw material since the early part of this century. Cotton and most other raw materials have undergone a gradual reduction in cost, and the price of the manufactured goods has been much lowered, so as to place the articles within the reach of a larger number of consumers. The price of flax, however, has remained very much the same, and though linen goods are certainly cheaper than formerly, almost the entire saving has been effected by introducing improved means of manufacture; a saving of course not peculiar to the linen trade, but equally enjoyed by all others. I believe the various operations of spinning, weaving, and bleaching flax fibre have from time to time been as much improved as could at all be expected; in fact every thing that skill, science, and capital can do, has gradually been brought to bear in perfecting those departments; but any trade, no matter how well managed, necessarily languishes without the foundation of a plentiful, cheap, and permanent supply of raw material, and that essential foundation has lately been sadly wanting, to the threatened injury of the important superstructure.

In order to assist us in forming an opinion as to the best means of overcoming the difficulty of a short supply of flax, let us turn our attention to the chief sources of supply. Let us assume that one-third of the flax required for the United Kingdom is grown in Ireland, producing good, useful, fibre, and the other two-thirds imported (I must say United Kingdom, as we have no perfect statistics of separate shipments to Ireland). Again let us divide the imported fibre into one-half Russian, comprising the coarse fibre, the other half from the remainder of Continental Europe, principally of fine quality. Now in Ireland the amount of flax sown varies as much as 70,000 or 80,000 acres within a few years; for instance, in 1857 it was 91,000 acres, and in 1853, fully 175,000; the difference in value within three years being, probably, £1,000,000; in 1859 the acres were 136,282, and in 1860 only 128,444.

While this variation so evidently exists, the demand for flax remains steady, and is only curtailed by the recent high prices. The exports of linen fabrics from the United Kingdom are about 4½ millions sterling per annum, and the home trade is probably equal—together say 9 millions; to this must be added the value of yarns exported, nearly 2 millions, making a total of 11 millions sterling. Though I cannot say positively, I would certainly estimate that two-thirds of this large sum is represented by the Irish linen trade, and the other third by the productions of Scotland and Yorkshire; however this may be, it is evident a very large quantity of flax is needed for the production of so large an amount of linen fabrics, and the demand would certainly much increase if more moderate rates prevailed.

Irish flax, on the whole, is undoubtedly the best, but the variations referred to make the supply very uncertain; these variations are, no doubt, chiefly caused by the comparative price of grain. When grain brings a high price the breadth of crop under flax is diminished, while if it remains at a low rate the farmer is naturally induced to sow more flax seed. But there is another influence working against an increase of flax cultivated in Ireland, namely, the gradual introduction of the Scotch and English system of tillage farming on a large scale.

As farms increase in size, and labour becomes dearer, it is probable flax will be even less grown; it is essentially the small farmer's crop, sown by himself, and cleaned, pulled, steeped, even scutched by his wife and children, for whom these occupations form a nice, light, agreeable kind of hand-labour.

I may here state that many sensible and thoughtful men do not approve of the present great anxiety shown by some land owners to convert *all* their estates into very large holdings. The small farmer has his failings, and in bad seasons may be behind a little in paying rent, yet we can't do without him altogether. It is from such families the best conducted and most intelligent labourers and artizans are to be had; the former to carry on improved systems of husbandry, under the guidance of trained agriculturists; the latter to create our ships, to erect our houses, to build our bridges, and to contribute in many ways to our general prosperity.

The roving sons of such families often enter our army and navy, and they are no doubt, from their early advantages of education and example, the most likely men to rise to the apparently humble, but really very important, posts of non-commissioned officers.

The small farmer is almost sure to exist, and to thrive in districts where the linen trade is carried on, as he can spend profitably, at scutching or weaving, the winter months that otherwise would be almost unproductive, while the change to agricultural labour in the spring and autumn braces his constitution after the winter's indoor work. In more purely agricultural districts, in addition to some of the small farmers' sons working at large establishments, there is often a cottage or two on his holding, which the ordinary labourer can get at a cheap rent, and these two things working together have a tendency to provide dwelling accommodation, and to prevent more or less that dreadful system of crowded, miserable lodgings for the poor so recently exposed in the south of England.

I do hope and trust that the modern plan of converting estates into large farms (which it must be admitted is a very judicious system within reasonable limits) may not in future be carried too far, and that there may be left a moderate proportion of small-sized farms in every neighbourhood. Anyone who doubts the advantages of doing so should visit the counties of Antrim, Down, and Armagh, where this mixed system is now in existence, and where flax cultivation is also carried on pretty largely. Before "clearing" the large estates in the south-west of Ireland of almost all the unfortunate cottier tenants, would it not be well to try the advantages to be derived from flax cultivation, carefully introduced and gradually extended.

The children of the cottier can greatly assist in this work, and, if moderately well managed, a larger return of profit can be made per acre than by any grain crop.

If the well-known Father Daly would take this matter up, he might confer a benefit on Connaught equal, if not superior, to the establishment of the "Galway" Atlantic line of steamers, for which he has obtained so much credit.

There is a Flax Society formed in Munster—President, Lord Fermoy; Secretary, Mr. J. D. C. Kenefick—and it will be gratifying to hear of their success in that province. They have received every encouragement from the Belfast merchants, and I hope will persevere in their laudable object.

The North-East Agricultural Association of Ireland has formed a sub-committee, consisting of myself, J. Richardson, Esq., and J. Borthwick, Esq., to attend to the growth of flax in Ireland. We issued last spring an amended code of regulations for the management of the crop, and circulated about 1,000 copies through the country.

This committee will doubtless adopt further steps for disseminating information and removing the unreasonable prejudices that, in some localities, still exist. The difficulty they will have to contend with is not so much the growing of the plant as the after-management. Still the Irish are reputed to be as quick witted as the French or Belgians, who have been so successful in the skilful manipulation of flax, and I believe, with a little attention, in the way of keeping the matter before the agriculturists of this country, much improvement in this respect will result.

The common reply to the question "Why don't you grow flax?" is "That it is too troublesome." The next question naturally is, "But if you get well paid for your trouble, that surely is not a sound objection." Answer—"Well, you see, I have no steeping ponds; and if I put it into the river, I'll get into a row with somebody." This difficulty is in some neighbourhoods greatly felt, and can only be overcome by several adjoining farmers uniting to make a series of ponds in some waste corner, for their mutual accommodation.

This difficulty does not arise in those localities where bogs exist, a common feature in Ireland, as the bog holes do very well for retting flax.

In portions of the county of Derry, where wheat will not ripen, the farmers often grow flax after potatoes, in lieu of that grain, followed by clover and grazing, then oats. "The wheat pays the rent" on rich land, and it is pleasant to find on ground where it won't succeed, an equally profitable crop of national importance take its place.

From Belgium, Holland, and France we cannot expect to find an increased importation; the present high prices for flax are no doubt bringing us now as much as we can reasonably expect.

In Russia the abolition of serfdom, it is said, will rather act against an increased production than otherwise.

In the British North American Colonies hand-labour is too expensive for large investments in flax growing. Attention has therefore more than ever been directed to India, where labour is cheap and abundant, and the evidence given before the House of Commons has so confirmed the impression in favour of trying flax cultivation there on a large scale, that it would appear highly culpable to neglect so favourable an opening. The following extract of a portion of this evidence contains much useful information:—

Mr. Dewar said:—"This statement, which I hand in, will give the imports and produce of Ireland over a period of ten years, showing a very large decrease, more particularly in the present year, and the exports of linen manufactured goods and yarns. [The same was handed in, and is as follows:]

Years.	Imported Flax.	Produce of Ireland.	Total Quantity.	Exports.	
				Linen Manufactures.	Linen Yarn.
	Tons.	Tons.	Tons.	£	£
1848	...	...	...	2,802,789	493,449
1849	90,333	15,000	105,333	3,493,829	732,065
1850	91,145	22,700	113,845	3,947,682	881,312
1851	59,709	36,388	96,097	4,107,396	951,426
1852	70,435	33,965	114,400	4,231,786	1,440,565
1853	94,146	43,374	137,520	4,758,432	1,154,977
1854	65,162	35,606	100,768	4,108,457	944,502
1855	64,672	23,465	88,137	4,118,013	932,981
1856	84,352	27,000	111,352	4,887,780	1,365,980
1857	93,312	24,000	117,312	4,511,454	1,647,879
1858	64,195	26,599	90,794		

The whole of Mr. Dewar's evidence was printed and circulated, and the matter was much discussed at the principal seats of the flaxen manufactures in Great Britain and Ireland.

To Belfast belongs the honour of making the first move; indeed neither Dundee nor Leeds has so far shown any active interest, further than publishing some papers and holding some meetings, the result up to this time being absolutely nothing. To Belfast therefore must be awarded the merit, should the design prove successful; and should it unfortunately turn out an unprofitable speculation, Belfast will still deserve praise for having

made so great an effort to procure for the depressed linen trade the much wanted supply of flax fibre.

At a meeting held in the Council Room of the Chamber of Commerce, Belfast, on Tuesday, 13th December, 1859, John Herdman, Esq., President of the Chamber of Commerce, was called to the chair.

D. M'Leod, Esq., Financial Commissioner at Lahore, was introduced to the meeting by the President, and communicated much valuable information regarding the capabilities of India for the production and cultivation of Flax.

Moved by Jonathan Richardson, Esq., M.P.; seconded by William Charley, Esq., J.P.; and

Resolved—"That this meeting is of opinion that the very unsatisfactory state of the linen trade arises chiefly from a deficiency of the raw material, and that an abundant supply, at a low average cost, would tend materially to the prosperity of the trade. This meeting, therefore, recommends the promotion of a Company, with limited liability, and a capital of £50,000 in £10 shares, for the purpose of obtaining a supply of flax and other fibres from India."

Moved by John Hind, Esq.; seconded by William Ewart, Esq.; and

Resolved—"That the following gentlemen—with power to add to their number—be appointed a Committee to carry out the objects of the meeting:—
J. Richardson, Esq., M.P., Wm. Ewart, jun., Esq., J. Charters, Esq., J. Herdman, Esq., Wm. Charley, Esq., J.P., E. H. Thompson, Esq., Finlay M'Cance, Esq., J. Hind, Esq., Wm. Richardson, Esq., Wm. Mitchell, Esq., J. Preston, Esq., C. Finlay, Esq., J. J. Weinberg, Esq."

Moved by John Preston, Esq.; seconded by Finlay M'Cance, Esq.; and

Resolved—"That the grateful thanks of this meeting be presented to D. M'Leod, Esq., Financial Commissioner at Lahore, for his kind attendance here this day, and for the very valuable information which he has afforded regarding the extension of the cultivation of flax in India."

JOHN HERDMAN, Chairman.
W. M'ILWRATH, Secretary.

The Company above referred to is now constituted, and has sent an experienced agent out to Lahore as a pioneer to prepare the way for more extensive operations.*

Some of the Irish newspapers were alarmed at the result of this meeting, and wrote very strongly on the subject, fearing it was contemplated to improve India at the expense of Ireland.

In order to correct this erroneous impression, I addressed to the editor of the leading agricultural journal in this country the following letter, the effect of which explanation he acknowledged to be satisfactory:—

FLAX CULTIVATION IN IRELAND AND INDIA.

Sir,—I have read your excellent article on flax cultivation, and agree in the general tenor of your remarks. There is, however, one point I wish to call atention to.

The entire of the flax produced in Ireland does not average 30,000 tons a year, while the consumption of flax in our linen manufacture exceeds 100,000. At present, therefore, scarcely one-third of the raw material is grown at home, though great attention has been given to the subject.

Every flax spinner will admit that Irish flax is the best for general use, but he cannot compel the farmers to cultivate it; the best recommendation in his power is the high price he is willing to pay for it when brought to market. The late Royal Flax Society was too much a spinner's society, as explained in my letter of 26th March, to which you refer. It must either be re-established on a broader basis, or the matter must be taken up by the various farming societies, in whom the agriculturists have confidence. I am sure Mr Richardson and myself, as well as every Irishman at the meeting the other day, felt most strongly the necessity and propriety of extending flax cultivation in Ireland; and in proposing a company to develop flax cultivation in India, we were actuated not by any want of sympathy for our native land, but by a desire to secure a large supply of low priced raw material, which would make coarse linens to approach cotton in price, and would tend to check the gradual substitution of that fabric in lieu of flaxen manufacture.

We should like to see our supply of coarse flax drawn from British India instead of Russia, and our medium and fine qualities grown in Ireland instead of Belgium; but we do not anticipate that Indian flax will be a rival of our home production. The cheap labour and fertile soil of the Punjab may produce a fibre that will compete with Russian produce; and if it does so it will be a great blessing to India, and a source of increased prosperity to the linen manufacturers of Ireland and Great Britain.

In conclusion, allow me again to express my warmest sympathy with your views as to increased flax cultivation in Ireland, and I trust the explanation I have given will convince you that our new Indian Flax Company is in no way antagonistic to the sound principles you advocate regarding home production.—Yours, &c., William Charley, *Seymour Hill*, *26th December*, 1859.

I have already said, but it is no harm to repeat, that I see nothing important to suggest at present by way of improvement in the manufacturing departments of the Irish staple trade. The extension of steam power looms, when supported by a large supply of cheap material, must eventually have a tendency to reduce the cost of production, and to bring the anciently esteemed luxury of wearing linen within the reach of the many, while the regularity of manufacture in these looms will more or less help to correct the want of a uniform system so observable in the old "market" goods.

In the bleaching department, of late years, increased certainty and greater despatch have been attained. The various operations are now conducted by intelligent and often highly-educated men, to whom the modern discoveries of science are really of some use, and who are wise enough to think that complex chemical and mechanical combinations require something more than ordinary skill and attention to ensure a successful result. The linen merchants of Ulster will yield to none in the empire for energy and business-like habits. They require no special stimulus to urge them forward, but will doubtless steadily uphold the supremacy they have already obtained in the old and new world. The only difficulty that meets them of any importance, is the range of hostile tariffs referred to in my last letter, and a very serious difficulty this is.

To compete with foreign producers in a foreign country would be something like approaching an even struggle, if the British merchant had only to overcome the disadvantage of distance, namely, freight and carriage, and risks connected therewith, but when, added to this, a duty of 20, 30, or 40 per cent. must be paid, the struggle appears a hopeless one; and yet the perfection of manufacture in these countries is so great, that even such an exorbitant duty is frequently submitted to to obtain the goods, in countries guarded by high protective tariffs, such as exist in Russia and Austria.

The new treaty of commerce with France is now concluded, and the rate to be levied on Irish linen fabrics is fixed at 15 per cent. and on yarns 10 per cent. These rates, nominally *ad valorem*, are reduced to specific duty on the principle of the former tariff, but in a rather simpler form, the number of classes being less.

By reference to the statistics accompanying my last letter, it will be seen that this new tariff is a great improvement on the old one, and is comparatively liberal. What the effect will be it is impossible yet to determine, but the general opinion in Belfast is that a considerable amount of business with France will ensue before long, though some years may elapse before Gallican prejudices in favour of their natural productions can be quite overcome. May not the completion of this new treaty prove the dawn of a new commercial system on the continent of Europe? If the other great nations follow the example of France, the leading difficulty our Irish merchants now find in their efforts to extend commercial relations with

* I enclose a sample of bleached linen, of medium fineness and excellent quality, manufactured by the Mayor of Belfast, entirely from Indian flax.

foreign countries will be greatly modified, and another bar to the extension and welfare of the linen trade removed.

In the extension and welfare of that trade all truly sensible men must feel an interest. Without its influence the province of Ulster would rapidly degenerate, for as a purely agricultural district it is inferior to the southern portions of Ireland, both in soil and climate; with its influence, creating employment for surplus labour and fine markets for the farmer, the country is prosperous, the labouring population is contented, the capitalist is repaid for his outlay, the landlord obtains a fair, well-paid rent; crime and pauperism are at a minimum point.

Many of the Irish landlords own estates also in England, and are wholly or partly absentees; the prosperity, therefore, of a branch of national industry that amounts in Ireland alone to fully six or seven millions sterling per annum, and helps very effectually to bring back to us something to balance the immense rentals spent out of the country, is a very important matter, and should not be lost sight of by those who feel concerned in their country's welfare.

At present, the deficient supply of raw material, and the phalanx of hostile tariffs, are the chief difficulties to be overcome.

I have pointed out the efforts made in Ulster towards conquering these obstacles. In Russia and the rest of Europe, we have no power or influence over the supply of flax, except the offer of tempting prices. In Ireland and India there is a large field open, and Belfast, almost unaided, is honourably striving to increase in both countries the cultivation of this highly useful plant.

The question of foreign tariffs is now in a more hopeful position than for many years past, though much yet remains to be done. Government should be frequently reminded of the importance of obtaining further concessions, and following up the principle so successfully enunciated in the late French treaty of commerce.

I must now bring my labours as historian of the flax plant and its products in Ireland, to a close. My intention, when I published my first letter some years ago, was merely to contribute a few passing papers, but I found the subject had received so little literary notice, and information connected with it was generally so meagre and scattered, though admittedly a subject that constitutes an important element of our national prosperity, that it appeared to me very desirable to place in regular form an account of the whole matter, its past history, and present position.

The task has certainly not been a disagreeable one, though much more onerous than I ever could have contemplated when beginning it. In conclusion, I may say that the composition of these papers has added considerably to my own stock of knowledge, and I am therefore sanguine enough to hope that the perusal of them may have given some useful information to the numerous intelligent members of the Society of Arts.

OIL SPRINGS.

The following is taken from the City article of the *Times*:—

Numerous advices appear to confirm the great value of the oil springs lately discovered in the United States and Canada. The question as to the duration of their yield remains to be settled, but it seems probable that, owing to the extent of the regions in which they are found, the supply will last many years, and that a proper organisation of railway facilities will alone be needed to cause the production to be among the most important in modern commerce. In the United States the principal deposits are understood to be close to a station on a new railway—the Atlantic and Great Western—which will render their conveyance to New York comparatively inexpensive. In Canada they are about 12 miles from the Wyoming Station of the Great Western of Canada Railway, and some arrangements will be necessary for the transit over that distance, the existing roads being of the worst description. At the site of the principal wells the ground was two years ago covered by an almost unbroken forest. Now there is a resident and constantly increasing population of upwards of 500. During last winter the coaches took an average of 50 people daily to the spot from Wyoming, and many bought land and remained. There are several inns filled to overflowing. Two good hotels are in course of erection. Houses and shanties are rising on all sides, and the greatest activity is everywhere apparent. At present there are about 100 wells in full operation, all yielding oil. The land is held in large blocks, the owner leasing acres and half acres for 99 years. The terms usually are 300 dollars for the privilege and one third of the oil drawn from the wells. The wells are sunk and cribbed to a depth of from 40 to 60 feet till the rock is reached. In many cases surface oil is found before reaching the rock, but it is of rather inferior quality and doubtful yield. After arriving at the rock, the wells through the earth being from 4 to 7 feet square, they drill to the depth of from 40 to 70 feet, between which distances oil is almost sure to be discovered. Wooden tanks, varying from 500 to 2,000 gallons capacity, are constructed close to each well. The oil is pumped into these, and afterwards drawn off into barrels to be sent to market. The cost of a well is very small. Parties are in the district making contracts for sinking wells. Their charge is for sinking through the earth, 2½ dollars per foot, and for drilling through the rock, 2¼ dollars per foot. A well after being commenced usually yields oil in less than 30 days. At these prices a well can be sunk, a tank for 100 gallons made, and a pump and all necessary appliances provided for a sum equal to about £100 sterling. When oil is found, one man at 4s. a day can readily pump 100 barrels, or 4,000 gallons, a day. The cost of the oil, including every expense, and calculating the re-imbursement of every outlay incurred in one year, and also calculating a yield of 15 barrels, or 600 gallons a day, is, it is alleged, absolutely less than a halfpenny sterling a gallon delivered into the tank alongside the well. Very few attempts have yet been made to pump by steam at the place where the oil is most extensively found, nearly all the labour being by hand. This is partly to be attributed to the badness of the roads, preventing the possibility of getting heavy loads into the district, and partly to the yield of the wells being on an average about equal to the quantity a man can easily pump in a day.

A moderate average yield for all the wells now in operation (100) is 15 barrels, or 600 gallons a day. At the rate at which privileges are being disposed of and parties are preparing to sink wells, there will be 500 in operation before Christmas. Taking the present 100 wells only, however, the result is extraordinary. Thus—100 wells, yielding 600 gallons, give 60,000 gallons per day, 360,000 per week, or 18,720,000 per annum. A trustworthy observer remarks:—"Such a yield seems almost fabulous, and yet I believe, from personal observation and inquiry on the spot, that it is within the truth."

MODELS AND DESIGNS FOR FRANCE.

The following is extracted from the *London Gazette*:—

The Right Honourable the Lords of the Committee of Privy Council for Trade have received, from the Secretary of State for Foreign Affairs, a copy of a note from the French Chargé d'Affaires at this Court, stating that the models and designs intended for registration under the provisions of the French law, the benefit of which has been extended to them in pursuance of the 12th Article of the Treaty of the 23rd January, 1860, between Great Britain and France, must be forwarded to the Secretaries of the Conseils de Prud'hommes, at Paris, in sealed packets or boxes, which will be admitted into France free of duty, subject to the necessary formalities.

Instructions have been issued by the French Government to the Presidents of the Conseils de Prud'hommes to

follow the measures adopted at the Registry of the Tribunal of Commerce with regard to foreign trade marks, in cases where the deposit of models is not effected by the actual proprietors. In such cases an agent must be furnished with a power of attorney, either under private seal, or attested before a public notary, bearing a French stamp and authenticated by a French Consul, which must be registered, and delivered by the agent to the Secretary of the Conseils de Prud'hommes. The registration fee is two francs, whatever may be the number of designs or models deposited.

In cases where the power of attorney is written in the English language, a second registration fee will be charged on the translation which is required to be deposited.

MUSEUM OF PRACTICAL GEOLOGY.

The Museum of Practical Geology, Jermyn-street, will be re-opened to the public on Tuesday next. During the vacation some important additions have been made to the wall decorations in the Hall, consisting of inlaid slabs of polished granites, porphyries, marbles, and alabaster, by Mr. Macdonald, of Aberdeen, and Mr. Hall, of Derby. Some of these specimens have never before been employed in the arts, and deserve the attention of architects.

Home Correspondence.

READINGS AT MECHANICS' INSTITUTIONS.

Sir,—I have met with instances where Miss Nightingale's "Notes on Nursing" have been read with much interest to classes of adult persons, and to advanced classes of girls in schools; and I have been assured that the information thus promulgated has been early attended with instances of beneficial sanitary reforms at their homes.

The discussions on the text have elicited interesting local illustrations, and valuable directions of practical applications of the principle to peculiar local conditions.

Miss Nightingale has prepared a new and cheap edition of the work, with some abridgement, but with important additions, for the use of the labouring classes.

I venture to recommend, as highly important, that at each Mechanics' or Literary Institution, some one should be asked to read particular chapters of the work, as papers, to the members of the Institution, and then take discussions upon them, in which the observations of members might be contributed. (It were most desirable if some physician, or medical or health officer, could be got to undertake the task.)

The chapter in the new edition on "Ventilation and Warming," would form a good paper for one evening's discussion.

The chapter on the "Health of Houses" would also serve as another most important chapter for another evening's reading and discussion.

The short chapter on "Personal Cleanliness" would supply a text for a separate instructive discourse and discussion.

Considering the immense proportion of deaths in the infantile stage in the United Kingdom, the great mass of which are preventible, the chapter on "Minding Baby" is one of commensurate importance, on which the attendance of the females of the families of members and their friends might be specially invited; and the medical practitioners of the neighbourhood should be asked to state the results of their observations.

Amongst competent medical professors of sanitary science, in America as well as in England, I have met with but one opinion, coinciding with my own, on the practical soundness and great value of the expositions in the "Notes," of sanitary principles, made from the authoress's own long and varied observation.

By the liberality of Mr. Harrison, I am enabled to propose to the Council, to forward to the managing committee of each Institution a copy of the new edition of the "Notes," with the view to their consideration of the eligibility of their use for the purpose I have suggested.

It may be almost unnecessary to add, that much of the practical suggestions of the "Notes" would be most congenial to female classes.

I am, &c.,
EDWIN CHADWICK.

Richmond, Surrey, August 20th.

A SUBSTITUTE FOR SOME PATENTS.

Sir,—It is a disputed point whether patents do more good or harm. They are believed to stimulate men, by the hope of large profits, to bring their inventions to perfection, and to induce them to publish the details of their inventions, instead of keeping them concealed as they might try to do, if that were the only way of securing profit from them. On the other hand, many patents cost much more than they are worth, and those which do succeed cost the public very much more than the patentees get. From the very nature of the case this must necessarily be so. A patentee is compelled to spend much money unproductively (which he must either lose or charge his customers for), first in getting his patent; next in defending it from piracy; and, lastly, as his capital is limited, he is probably induced to try to make a large rate of profit from a small business, instead of the ordinary rate of profit from a business extended to its natural dimensions. For these and other reasons the cost of a patented article is much higher than if there were no patent, and a part only, often a small part, of the excess is real profit to the patentee. Often, moreover, the real inventor is not the one most benefited, he having been obliged to sell his interest for a trifle before his invention has been brought into profitable use; still more frequently all concerned meet with nothing but loss and disappointment. But this is not the worst. These unsuccessful patents are not simply useless, they may be unmitigated nuisances—useless to their possessors, injurious to everyone else—by impeding the progress of other improvements of which they may be a part, though perhaps but a small part.

Notwithstanding all these heavy drawbacks, I believe the general opinion is in favour of allowing real inventors to secure for themselves a limited right of exclusive use, and until some other mode of rewarding them for their ingenuity and perseverance, and inducing them to make their inventions public is devised, it is hard to see how patents can be fairly refused.

It must, however, be very evident that it is most desirable that the number of patents should not be greater than is unavoidable, and if some other method of rewarding inventors could be devised, free from risk to them, and not involving any increase to the cost of the articles produced, it might be of great advantage both to them and to the public; that is, they might receive a larger amount of nett profit for successful inventions, with very much less charge to the public, while unsuccessful ones would be simply useless without doing the harm a patent does by enabling those who cannot succeed with it, to prevent others from trying.

All this might, I think, be accomplished by a very simple arrangement, for making a very small charge upon all instead of a heavy charge upon part of the community, to reward those who succeed in making useful inventions which are of benefit to the nation at large. My proposal is, that a department of government shall publish descriptions of any inventions or improvements in the arts, &c., &c., which their authors think fit to send, and which they decline to patent; that every invention or improvement so published may be freely used by any one, and that the inventor or improver shall be entitled to a reward, to be paid by Parliament for a limited period, calculated in proportion to the estimated value to the nation of his improvement.

I believe a very small per centage upon this value would

pay inventors better than they are now paid by the profits on patents, and that a few thousands a year paid directly by Parliament, would save many thousands now paid by the public, to say nothing of the losses suffered indirectly by impediment to improvement that patents so often prove. I do not, however, propose that inventors should be compelled to take their chance of the Parliamentary reward. I think they should have the option of taking out a patent if they consider that most to their interest. I would try only to induce them not to do so, by offering them an alternative, which, if Parliament would be liberal without being profuse, might reward inventors better and tax the public less.

It may probably be objected that it seems unjust to tax those who do not use inventions, to save those who do; but that is a weak objection, for whatever will promote or remove impediments from the progress of industrial arts in England, most increase the national prosperity and wealth, and must, therefore, be profitable to us as a nation.

I am, &c., P. H. HOLLAND.

36, Camden-square.

Proceedings of Institutions.

BURY ST. EDMUND'S ATHENÆUM.—The eighth annual report of the Bury St. Edmund's Athenæum and Suffolk Institute of Archæology, Statistics, and Natural History, states that the library issues for the past year have been:—Books, 12,400; periodicals, 3,460; papers, 1,380. This return, allowing for the circumstance that the library has been open during the whole year, shews an increase upon the issues of last year, and is nearly equal in amount to the year preceding last year, which gave the largest return of books issued since the formation of the library. A considerable part of the increase of the issues this year has been due to the exertions of the members of the Amateur Reading Society. The additions to the library, by purchase, have numbered 120 vols.; by presentation, 5 vols. The attendance at the Working Men's Free Reading Room has been very regular, but has not increased upon last year; the men have been orderly, and appear to begin to value the privileges accorded to them. In compliance with the resolution adopted at the last general annual meeting, the Lecture Committee, knowing full well the importance of economy in their department, have endeavoured to reduce, within the least possible limit, the expenditure attendant on lectures and entertainments. The following were the lectures delivered:—"Italy, past and present," by the Rev. Lord Arthur Hervey, M.A., the Marquis of Bristol, Patron, in the chair; "Electro Magnetism," by the Rev. Edwin Sidney, M.A., with the experiments manipulated by Mr. Ladd; "The Study of History," by Professor Kingsley, M.A.; "The Lost Polar Expedition," with illustrations and relics, by Capt. Parker Snow; "The Ely Lantern," by the Very Rev. the Dean of Ely; "A Visit to the Alps, in 1860," by the Rev. Edwin Sidney, M.A., illustrated with views and photographs by Messrs. Carpenter and Westley; A Conversazione, Sir Charles Bunbury, Bart., in the chair; Papers—"Richard Bayfield, Monk of Bury," by John Greene, Esq.; "On Floral Fêtes," by W. Orbell Kitchener, Esq.; "Novel Reading," by the Rev. J. L. Williams, M.A.; and "On Wit and Humour," by George Grossmith, Esq. With reference to class instruction, eighty-five names were entered for the various classes agreed upon by the committee at the commencement of the season. The 1st and 2nd French classes have been well and regularly attended; many of the members having continued their studies during several seasons. The teacher reports that "he is very much pleased with the progress made in both the French classes, also with the increased interest the members seem to feel in their studies, and with their uniform good attendance." The Latin class also promised well; but as most of the members were employed as gardeners, and were required to be in the glass-houses during the severe frost, the attendance was very irregular. The number of pupils who have attended the drawing classes, and the work which has been done (as shown at the Conversazione), are most gratifying. With the consent of the Library Committee, the first reading-room has been permanently fitted up as a class-room, with moveable frames for drawings, and shelved cupboards, which are furnished with models. Thirty-four pupils have received instruction, the greater number of whom have been most regular in their attendance. Whilst the Institution and the members of classes are deeply indebted to all the class teachers, it is difficult to over-rate the obligations which they owe to Mr. Thomas, the teacher of drawing, or to speak too highly of the kindness with which he devotes so much of his time and exertions to the improvement of his pupils. During the past season he has given no fewer than 487 free drawing lessons. The committee have great pleasure in adding, that J. H. Porteus Oakes, Esq., having visited the class, expressed his satisfaction by a handsome donation, to be laid out in models for the use of the class—in addition to which he has made an offer that, as soon as one of the pupils has given proof of his fitness and ability, and has made the requisite progress in drawing, he will undertake to apprentice him as a glass painter, free of expense, and will also assist in maintaining him during his apprenticeship. Readings and lectures to the working classes only were delivered during the winter months, by the following gentlemen:—Rev. J. Richardson; Johnson Gedge, Esq.; Rev. Alfred J. Perry; Rev. J. L. Williams; James Sparke, Esq.; Rev. W. F. Newton. The committee of archæology and natural history have again the pleasure to report that its numbers have been sustained; that in the districts visited during the past year, the Institute has, as heretofore, met with the most gratifying reception, and that they have been instrumental in bringing to light much valuable historic and archæological information connected with the respective localities; and the members and their friends have been permitted to inspect many choice and otherwise unseen stores of ancient art. In the museum report, for 1859, it was mentioned that a subscription had been opened for the establishment of a permanent fund for purposes of natural history. The sum of £29 9s. 6d. was subscribed towards this desirable object, of which £6 12s. 6d. remains to be collected, and £16 19s. has been expended. By this means the committee have been enabled to make many important additions to their collection; including a complete set of Mr. Hawkins's models of extinct animals, several collections of fossils, &c., and two fine lions, which, with other specimens, now only wait for cases before being placed in the museum. It is now thought advisable to enlarge the fund as much as possible, but to apply it to general museum purposes, as well as to those of natural history—so as to add to the interest, and develop the educational uses of the museum. The amateur reading society, during the past session, has been most successful in its operations; for not only have the members' practice meetings been well attended, but the public readings also have met with the greatest encouragement from large and appreciating audiences. Of preliminary and other meetings 8 have been held; members' readings for practice 26; average attendance at such meetings, 20; public readings, 6; soirée, 1; authors from whom subjects for reading have been selected, 116; number of pieces read, 340. From an analysis of the readings it has been found that the greatest number of extracts have been chosen from the following authors:—Addison, Bulwer, Barham, Byron, Campbell, Coleridge, Cowper, Dickens, Gray, Helps, Hemans, Hood, Keble, Kingsley, Knowles, Lamb, Longfellow, Macaulay, Milton, Montgomery, Moore, Poe, Praed, Proctor, Rogers, Ruskin, Scott, Shakspeare, Sheridan, Southey, Tennyson, Withers, Wordsworth and Young. The balance sheet of this society for the session of 1860 and 1861 shows that the receipts have amounted to £20 8s. 11d., and that there is a balance in hand of

£8 16s. 4½d. With this balance a set of books has been purchased for presentation to the library of the Athenæum, a clock has been purchased for the observatory. During the last 12 months about 500 persons have availed themselves of the telescope.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, August 30th*, 1861.]

Dated 25th April, 1861.

1036. P. G. Gardiner, New York—Imp. in the construction of springs

Dated 26th July, 1861.

1873. J. F. Bourne, Demerara—Certain imp. in the construction, armament, and equipment of batteries, floating or otherwise, for war purposes.

Dated 5th August, 1861.

1943. R. A. Brooman, 166, Fleet-street—Imp. in locks and other fastenings and in keys.

Dated 13th August, 1861.

2006. J. H. Elvans, 7, Guildford-place, Lower Kennington-lane—An improved steel busk or stay fastening.
2010. J. Lancaster, Princes-street, Bedford-row—A new method of producing sand.
2012. J. G. Renny, Brussels—Imp. in the manufacture of articles of furniture by utilizing certain parts of the cedar tree in such manufacture, which have heretofore been considered and treated as waste.
2014. N. Common, Brighton—Imp. in apparatus applicable to water-closets and urinals.

Dated 14th August, 1861.

2016. W. Robertson, Manchester—Certain imp. in machines for preparing to be spun cotton and other fibrous materials.
2018. N. Cox, Chester—Imp. in the construction of iron ships, the said imps. relating to the method of attaching or securing bulkheads to the frames or ribs thereof.
2020. F. Durand, Paris—Imp. in the manufacture of metallic tubes.
2022. G. J. Wainwright, Dukinfield, Cheshire—Imp. in certain parts of machinery or apparatus used in preparing and spinning cotton or other fibrous materials.
2024. E. Edwards, 13, Beaufort-buildings, Strand—Imp. in machinery or apparatus for separating mineral ores, coal, and other substances from impurities.

Dated 15th August, 1861.

2028. A. Lebaudy, 12, Rue de Douai, Paris—Imp. in towing vessels or boats on rivers. (A com.)
2033. P. Webley and T. W. Webley, Birmingham—A new or improved elevating rifle sight.
2034. F. A. Kain, Redhill, Reigate—An improved manufacture of artificial stone or earthenware applicable for bricks, tiles, retorts, railway sleepers, and other articles.
2036. S. Desborough, Noble-street, St. Martin's-le-Grand—Imp. in the manufacture of umbrellas and parasols.
2037. A. F. Menard, 10, Rue de Strasbourg, Paris—Imp in tanning, and in the apparatus employed therein. (A com.)
2038. C. W. Kesselmeyer, Manchester, and T. Mellodew, Oldham—Imp. in the manufacture of velvets and velveteens.
2040. J. Faucherre, Green-terrace, Middlesex—An improved mode of manufacturing gold dials.
2041. R. D. Chatterton, Highbury-terrace—Imp. in transmitting motive power, especially applicable to piston propellers.
2042. T. Murcott and C. Hanson, Haymarket—Imp. in breech-loading arms.

Dated 16th August, 1861.

2044. A. V. Newton, 66, Chancery-lane—Imp. in knitting and in machinery therefor. (A com.)

Dated 17th August, 1861.

2045. H. C. Hill, Stalybridge—Imp. in the construction of fire-proof buildings.
2046. T. Settle, Bolton—A certain imp. in machinery or apparatus employed in preparing cotton, wool, flax, and other fibrous substances for spinning.
2047. E. Sutton, Radcliffe, Lancashire—Certain imp. in machinery or apparatus for preparing cotton and other fibrous substances for spinning.
2048. M. H. Randle, 22, Ludgate-hill—An imp. in sous-juppe or under petticoats for distending articles of dress and preserving the shape or form thereof.
2049. P. Walters, Wolverhampton—Imp. in machinery for cutting, sawing, and slicing or planing wood and other substances.
2052. R. Caunce, Nottingham—Imp. in carding engines.

Dated 19th August, 1861.

2054. Z. Colburn, 15, Tavistock-street, Bedford-square—Imp. in the construction of suspension bridges.
2055. J. Robb, Aberdeen—Imp. in ventilating.
2056. G. T. Selby, Smethwick, Staffordshire—An imp. in surface condensers.
2058. W. H. Smith, London—Imp. in the preparation, application, and manufacture of peat.
2059. W. Gossage, Widnes, Lancashire—Imp. in the manufacture of certain kinds of soap, and in the construction of apparatus to be used in such manufacture.
2060. W. Firth, Burley, Leeds—Imp. in machinery for digging or turning up soil, mowing, reaping, and other agricultural purposes.

Dated 20th August, 1861.

2062. B. Hargreaves and J. Hargreaves, Burnley—Imp. in the valves of steam engines.
2066. H. Emes, Adelaide-road, Haverstock-hill—Imp. in dress fastenings which are also applicable to other purposes.
2068. R. A. Brooman, 166, Fleet-street—An improved steam mill or apparatus for transmitting motive power. (A com.)
2070. S. Warwick, Lower-road, Islington—An imp. or imps. applicable to concertinas.
2072. J. Platts, Glasgow—Imp. in looms for weaving.
2076. G. F. Muntz, French Halls, Birmingham—Imp. in sheathing iron ships or vessels.

Dated 21st August, 1861.

2080. C. A. Wheeler, Swindon, Wiltshire—Imp. in preventing wind draughts at the foot of doors and allowing them to open over carpets or other substances without the use of rising hinges.
2082. W. Mason, Liverpool—An improved soap. (A com.)
2084. W. Clark, 53, Chancery-lane—Imp. in the construction of buildings whereby to utilize the waste heat passing up the chimneys. (A com.)
2086. N. Salamon, 8, Ludgate-street—Attachments or apparatus for sewing machines. (A com.)
2090. A. Jervis, Coventry—Improved machinery for the manufacture of pleated, ribbed, and looped fabrics.
2092. T. Grahame, Worthing, Sussex—Imp. in the construction of boats, rafts, and other floating structures.
2094. J. Kane, Templemoyle, near Dungwen, Ireland—Imp. in treating flax, hemp, and other analogous substances which yield fibres for the purpose of manufacturing from them fibres adapted to be spun into yarn and thread.

Dated 22nd August, 1861.

2096. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the preparation of pulp for paper. (A com.)
2098. E. Landsberg, sen., Paris—Imp. in porte-robes or buttons for holding up the skirts of ladies' gowns.
2100 L. M. Casella, Hatton-garden—Imp. in mercurial thermometers.
2102. W. Baines, Smethwick, Staffordshire—Imp. in the construction of girders, frames, or other apparatus fixed or moveable, and for certain peculiar forms or sections of iron used therein.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

2088. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Certain imp. in presses for lithographic printing. (A com.)—21st August, 1861.
2119. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Imp. in the propulsion and steerage of ships or vessels, and in the construction and arrangement of the machinery connected therewith. (A com.)—26th August, 1861.

PATENTS SEALED.

[*From Gazette, August 30th*, 1861.]

August 30th.

453. A. Barclay.
523. F. Tolhausen.
526. C. Smith and J. Carrick.
528. L. L. Sovereign.
534. T. Haigh and R. A. Robertson.
543. E. Sabel.
545. J. James.
546. G. Davies.
549. H. Hirsch.
554. T. Petitjean.
558. J. M. Carter.
561. E. Alcan.
562. C. Hanson.
575. W. E. Wiley.
578. W. S. Kennedy.
586. J. H. Johnson.
607. T. F. Griffiths.
648. A. Granger.
730. J. Potter.
733. G. J. B. Loyer.
757. J. Smith, jun.
849. W. Slater.
861. A. Shanks.
891. J. Lancelott.
920. A. Shanks.
937. W. Jenkins.
1205. W. Clark.
1470. J. Whitehead.
1629. S. Wenton.
1648. M. Henry.
1668. A. V. Newton.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, August 30th*, 1861.]

August 26th.

1949. R. Knight.

August 28th.

1965. J. L. Clark, F. Braithwaite, and G. E. Preece.

[*From Gazette, September 3rd*, 1861.]

August 29th.

1971. M. A. F. Mennons.

August 30th.

1988. A. V. Newton.

August 31st.

1985. J. Sloper.
1998. J. Robertson.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, September 3rd*, 1861.]

August 31st.

1892. J. Seithen.

Journal of the Society of Arts.

FRIDAY, SEPTEMBER 13, 1861.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £428,600, have been attached to the Deed.

THE EXHIBITION OF 1862 AND RAILWAY COMMUNICATION.

Mr. Robert K. Bowley, the General Manager of the Crystal Palace, has lately issued a paper on the importance of affording to the working classes throughout the kingdom the utmost facility of access to the Exhibition. He refers to the paper read before the Society, by Mr. Wm. Hawes, at the end of last Session, in which it will be recollected that the question of the adoption of a low price of admission, and its probable effect in producing a large attendance of the really working classes, was discussed. Mr. Bowley says :—

"Some of the statistics of Mr. Hawes had an important bearing upon this question, as they showed that while the attendance at the One Shilling or One Franc rate and upwards, at Paris and at London, bore a near approximation to the population of each capital, yet the Paris Exhibition had the advantage of 2,182,433 visitors who were admitted at a charge of 4 *sous* each, thus proving, what of course may be held to be self-evident, that to induce the attendance of the really working classes, very moderate outlay is essential.

"It is not, however, to the price of admission that attention should be solely directed, but to that more important because far wider question, the difficulty of access by the working classes to the Exhibition.

"No Exhibition in England can be properly developed which does not afford the opportunity for day excursions from all parts within reach of six or seven hours railway travel. This the Exhibition of 1862, with its present prospects will fail to effect, and it may safely be affirmed that this alone will prevent many hundreds of thousands, probably millions, from visiting it.

"It is not that railway access from all the great lines, north, south, east, and west, will not be nearly available, as the completion of the West-end extension line from Wandsworth to Kensington will bring railway communication with all the lines radiating from the metropolis to within a mile and a quarter of the Exhibition building prior to May, 1862. As, however, it is understood that the great companies forming this important junction intend building their main station in the Hammersmith-road, adjoining the bridge which carries the road over Punch's line, and as this proposed station is above a mile and three quarters from the main entrance to the Exhibition building,* it must obvious to all that, for the purposes of day excursions from distant places, it is practically useless.

"It should be borne in mind that no advantage is afforded by the Victoria station for excursion day traffic, as that is also above a mile and three-quarters (1 m. 6 flgs. 82 yds.) distant from the Exhibition; it is, therfore, as useless as the Hammersmith-road."

The author points out other serious objections, which, he says, would prevent Victoria station becoming the general railway route to the Exhibition, for the approaches to it across the new railway bridge are too limited and inconvenient to afford proper facilities for extensive day excursion traffic from various parts of the kingdom. He goes on to say :—

"It need scarcely be pointed out that to have a gap of more than a mile and a half between the railway terminus and the Exhibition building must be entirely destructive to day excursion traffic. At a period like that of a London International Exhibition, and at a station some miles away from the heart of the metropolis, like that proposed in Hammersmith-road, not the least dependence could be placed upon road conveyance to the Exhibition; what little existed would be uncertain in the extreme, and exorbitant in charge, particularly as a heavily taxed turnpike intervenes between the two points.

"It being thus certain that day excursions from the main lines of railway will be practically unavailable, under existing or present contemplated circumstances, it becomes a serious inquiry for the interests of the Exhibition, Is there any remedy to this great drawback to its success?

"Fortunately (he says) that remedy does exist. It is attainable at a moderate and amply remunerative cost, and it is capable of accomplishment before the opening of the Exhibition on the first May next. A short branch line, of a mile-and-a-quarter only in length, may be made the direct line from the Kensington and Wandsworth Junction, between Earl's-court and North-end, to within a few hundred feet of the Exhibition main building, which would fulfil all the requirements of the case. No cuttings, no heavy embankments are required. It would run nearly on the level. Four lines of railway, perhaps with a loop or circle at the Cromwell-road end, so as to avoid shunting or drawing back the carriages, would suffice. Temporary wooden sheds or stations are all that would be at present needed. If this is managed economically it must give a handsome return for outlay.

"A line thus formed would bring to the doors of the Exhibition, traffic from all the principal railways. In fact it would bring all the railway service of this greatly developed railway country into one focus, and that focus the great attraction of the day, the International Exhibition. Who would be bold enough to place a limit upon the numbers of the working classes who, from all our great manufacturing and other districts, would attend the Exhibition, provided they could do it by day excursions, so arranged as not to entail upon them the expense and difficulty of lodging for even one night in London, at such an expensive time as 1862 will be.

"With the working man, time is money. If he has to spend three days in going and returning, and visiting the Exhibition, how few, comparatively, can indulge the luxury.

"It is difficult, however, to over-estimate the numbers which, under favourable circumstances, might be brought from the densely-populated districts to visit the Exhibition. The last agricultural show at Leeds was visited by 77,000 persons in one day, the bulk of whom were carried into that town for the day by cheap excursions.

"If a little consideration is given to the immense population existing within six or seven hours' railway ride of South Kensington, it will be seen what an important bearing this question has on the probable success of the Exhibition. For instance, from Margate, Dover, Hastings, Brighton, Portsmouth, Southampton, and adjoining places on the South Coast and intermediate districts, the present third-class excursion rate varies from half-a-crown to three shillings and sixpence. Arrangements may be probably made between the railway companies and the Commissioners of the Exhibition, for a joint issue of day tickets

* 1 m. 6 flgs. 163 yds.

(as now existing at the Crystal Palace), including conveyance and admission, without any advance on these rates. The least reflection will show how wonderfully this traffic would be developed by the extension of railway access to the Exhibition itself.

"If the range is extended along the western lines it will be found that considerably beyond Exeter, nearly two hundred miles off, that Cardiff, with Merthyr and its neighbouring coal districts, that Monmouth and Hereford, on to Shrewsbury and Welshpool, up to Chester, with Liverpool and Manchester, and from thence by Halifax, Bradford, and Leeds, in a line to the Humber, comprising within it also the whole of the Eastern Counties Railway system, are within the limits of single day excursions. Thus, from this, which embraces the largest portion of the United Kingdom, a population of probably upwards of fifteen millions would be brought within range of a day's visit to the Exhibition of 1862. In no other country could such a practical illustration of the power acquired by facility of railway travel be given—in no other country could a great International Exhibition be held which would develop such results as that of 1862, provided only that due attention is paid to the excursion traffic.

"It may be argued that the limit of six or seven hours railway travelling is too distant for excursions. In an ordinary case this would be so, but on an occasion like the present it may be safely relied upon that the great Railway Companies would do all in their power to assist such distant traffic, as it must be obvious that the more they encourage the habit of travelling the better it must be for their several lines."

Passing from the consideration of long traffic to that of metropolitan and suburban traffic, the author says that, features of great interest are presented in connection with the suggested junction with the Exhibition. He refers to the distance between the Exhibition building and various places in the heart of London, such as the Post Office, (4 miles 50 yards), Islington, (4 miles 790 yards), the Blackwall Railway Station, (4 miles 1,450 yards), the only access from them to the Exhibition being through crowded thoroughfares. The remembrance of the uncertainty of conveyance, the increase of fares by the omnibus proprietors—still more probable now that the London omnibuses are in the hands of a great monopoly—would be fresh in the minds of all who watched the Exhibition of 1851. The author proceeds as follows:—

"As the population of London since that time has increased by half-a-million, and as the habit of residing within short distances outside the metropolis has also brought a large increase of inhabitants near to London, it may be fairly assumed that from these sources alone the main thoroughfares leading to the Exhibition will be far more crowded than they were eleven years since, and the expense and difficulty of road conveyance proportionably increased. How materially this difficulty would be lessened by the construction of the short branch of railway proposed, a glance at the map of London will show.

"From the eastern and northern districts considerable numbers would avail themselves of the North London line, commencing at Fenchurch-street.

"For the south-east of London, trains run from the Crystal Palace station to Wandsworth, stopping at nine intermediate stations, in forty-three minutes. The return third-class fare is 9d. Five minutes longer travelling, and a few pence extra cost, and hundreds of thousands of passengers might be carried over the junction to the Exhibition doors.

"If these two lines of railway which encircle London from east and west by northern and southern routes, could be brought close to the Exhibition, as proposed, immense relief must be given to the main road thoroughfares, and great additional facilities placed at the command of the inhabitants of London and its neighbourhood for visiting the Exhibition.

"There is still a third route which might be made available as a main route to the Exhibition. Should it be attainable, its importance cannot be over estimated.

"At the meeting of the Charing-Cross Railway, held on the 7th of August, Mr. Hawkshaw, the engineer to the line, stated 'he was willing to make the attempt to have the line open to Waterloo by the 1st of May, 1862, to meet the requirements of the Exhibition.'

"A continuance of the South Eastern from London-bridge to Waterloo, thence on by South Western to Wandsworth, crossing the Thames by the junction now forming, would (with the short line now advocated) form a line to the Exhibition from London-bridge, of less than eight miles in length, nearly as direct as that by road through Cannon-street, Fleet-street, Piccadilly, and Brompton-road. Should this line be capable of accomplishment—should the South Eastern and South Western Companies be disposed to co-operate in working it, it must be clear that the question of easy railway access to the Exhibition will meet with a happy solution.

"It is no answer to the arguments here adduced to say that because the Exhibition of 1851, without these additional facilities of travel, was a great success, and was visited by upwards of six millions of persons, therefore this additional and convenient mode of access is not required. The only reasonable argument would be, if, despite these inconveniences, the visitors in 1851 were 6,000,000, how many are likely to attend in 1862, provided they are removed?

* * * *

"As somewhat in connection with this subject, it may not be out of place here to remark upon a growing necessity in the management of the Exhibition of 1862. It will not do to rely too much on the *prestige* of the 1851 Exhibition. In the years that have elapsed since then, much general experience has been acquired of the working of these institutions, a greater insight has been gained into the habits and inclinations of the people. It has become a recognised axiom in these undertakings that it is numbers which pay. The Exhibition of 1862 in its Art features will have a novelty of great interest to push it onwards, but this and other points of interest must be brought far more prominently and repeatedly under public notice than they have yet been. Far greater facilities now exist for this purpose than in 1850, but if they are not made use of the well-wishers of the Exhibition may find too late that to fully arouse public attention, continuous exertion and publicity are requisite.

The author urges the necessity of making immediate arrangements with the railways as to excursion traffic, and of arousing the interest of all classes of the community in the coming Exhibition.

"Set the example of originating Exhibition Visiting Clubs; enlist the co-operation of the clergy of all denominations; point out to the employers of labour how pleasant, and how profitable also, it will be to them to encourage, and, if necessary, to aid those dependent upon them in availing themselves of such an opportunity of witnessing the triumphs of industry and art; and above all, endeavour to lead those to whom the Almighty has in this world given wealth and influence, to assist their humble brothers and sisters to at least one day's enjoyment of the Exhibition of 1862."

If all this be done, Mr. Bowley does not hesitate to express his belief that the number of visitors to the Exhibition of 1851 may be doubled in 1862. He concludes by quoting from Mr. Hawes's paper above referred to:—

"The object of Exhibitions is to educate nations, not classes; it is not merely to amuse the rich, but to teach the people; not only to give information to the merchant and manufacturer to enable him to extend his works and increase his gains, but to show the people the progress of their rivals in trade and manufactures, that they may learn thereby in what manner best to exert their skill and intelligence."

BRITISH ASSOCIATION, 1861.

The following Paper was read before the Mechanical Section:—

FREIGHT AS AFFECTED BY DIFFERENCES IN THE DYNAMIC PROPERTIES OF STEAM SHIPS. BY CHAS. ATHERTON, CHIEF ENGINEER, H.M. DOCKYARD, WOOLWICH.

The national importance of steam shipping is a theme which demands no demonstration, and any attempt to originate, promulgate, and popularise inquiry into the comparatively economic capabilities of the steam ship as devoted to the international conveyance and interchange of the products of nature and of manufacturing art, irrespective of its application as an engine of war, is a task which requires no laboured introduction in support of its being favourably received for consideration by an association devoted to the advancement of science.

The former papers on "Tonnage," "Steam Ship Capability," and "Mercantile Steam Transport Economy," which the author of this further communication has been permitted to present to the British Association, and which appear in the volumes of its Transactions for the years 1856, 1857, and 1859, were devoted to an exposition of the technicalities of the subject as respects the mutual quantitative relations which displacement, speed, power, and coal hold to each other in the construction and equipment of steam ships with a view to the realization of definite steaming results. So far, therefore, these investigations have had reference to the constructive equipment of steam ships, but the course of inquiry now submitted for consideration is intended to be a practical exposition of the extent to which the expense per ton weight of cargo conveyed is affected by the various conditions of size of ship, dynamic quality of hull with reference to type of form, weight of hull with reference to its build, the economic properties of the engines with reference to the consumption of fuel, and the steaming speed at which the service is required to be performed, all which circumstances respectively, and in their combinations, affect the economic capabilities of steam ships for the conveyance of mercantile cargo, and consequently freights charged, to an extent not publicly known, because hitherto not specially inquired into nor promulgated by the press, and which in the distinctive details above set forth do not appear to have been duly appreciated even by the parties most deeply concerned in the mercantile control and prosecution of steam shipping affairs. The aggregate expenses incidental to the prosecution of steam transport service must generally regulate the average rates of freight at which goods are conveyed; and seeing to what an extent the ultimate cost of manufactured goods is dependent on the cost of transport, often repeated as freight charges generally are in the various stages of transition of material from the raw to its manufactured condition, and its ultimate consumption as a manufactured article, it becomes evident that this investigation especially concerns the manufacturing interests of the country. Economy of price inducing quantity of consumption, is the characteristic feature of the manufacturing enterprise of the present day, and it is the absolute cost of goods which affects consumption, irrespectively of the various causes in detail by which the cost may have been enhanced. Under these circumstances, it is remarkable to what extent the manufacturing interests, though keenly alive to legislative imposts, whether foreign or domestic, affecting the cost of goods, and sensitively jealous of legislative interference in the control of labour, as affecting the cost of manufacture, pass wholly unheeded deficiencies and imperfections in the practical control of shipping with reference to freight charges, though equally affecting the ultimate price of manufactures. Such incongruity demonstrates the necessity for popular exposition and inquiry into the various circumstances and combinations of circumstances which directly affect the expenses incidental to the conveyance of merchandise by steam ships, and by which the rates of freight are in the aggregate necessarily regulated. Freight, therefore, is the text of the following discourse, to which attention is directed under the various aspects of steam ship construction and management, by which freight charge is affected, and which may be classified under 10 heads or sections, as follow:—

SECTION A.—FREIGHT, as affected by variations of the size of the ship by which the service is performed.

B.—FREIGHT, as affected by variations in the constructive type of form of the hull.

C.—FREIGHT, as affected by variations in the working economy of the engines, with reference to the consumption of coal.

D.—FREIGHT, as affected by variations in the constructive weight of the hull, with reference to its load displacement.

E.—FREIGHT, as affected by variations in the constructive type of form, combined with variations in the working economy of the engines.

F.—FREIGHT, as affected by variations in the size of ship, combined with variations in the constructive type of form, and in the working economy of the engines.

G.—FREIGHT, as affected by variations of the steaming speed at which it is required that the service shall be performed.

H.—FREIGHT, as affected by variations of the size of ship, combined with variations of speed.

I.—Freight, as affected by variations of the speed, combined with variations of the working economy of the engines.

K.—FREIGHT, as affected by variations of the speed, combined with variations in the type of form, working economy of the engines, and weight of hull.

It will be observed that it is not proposed to determine the actual amount of prime cost expenses incidental to the prosecution of steam ship enterprise, by which the scale of freight charge may be chiefly regulated, but it is proposed to demonstrate, with reference to a specified unit of performance, the ratio or comparative scale of cost, in which the prime cost expenses incidental to the conveyance of cargo per ton weight of goods conveyed on a given passage is, *cœteris paribus*, affected by each of the various circumstances or conditions set forth under the 10 different heads above referred to.

The fundamental consideration on which it is proposed to base this investigation is this, that, within moderate limits of variation, the investment incidental to the fitting out of steam ships for commercial transport service is approximately proportional to the quantity of shipping as measured by the constructors' load displacement of the ships, and the amount of working power employed as measured by the indicated horse power, also that the interest on investment, upholding of stock, and all other annual expenses incidental to the working of steam ships, such as coals, stores, and wages, harbour dues, insurance, and pilotage, are approximately proportional to such investment; and further, as the mercantile service of steam ships employed on a given station generally requires that their passages shall be periodical it is assumed in the following calculations that the number of passages made annually by each ship is the same in all the different vessels assumed to be employed on the same service and brought into comparison with each other.

It is particularly to be observed that these calculations and deductions of comparative freight charges are not of general application to different services, but have reference only to the special service which, as an example of the system of calculation for any service, has been adopted as the unit of performance, namely, the performance of a ship of 5,000 tons displacement, employed on a passage of 3,000 nautical miles and steaming at ten knots

per hour, the co-efficient of performance by the formula $\frac{V^3 D^{\frac{2}{3}}}{\text{Ind. h.p.}}=C$, being $C=250$, and the consumption of coal being at the rate of 2lbs. per indicated horse-power per hour, which data have been assumed as the base of the following tabular statement, consisting of 19 columns, the purport of which is as follows:—

Column 1st.—Reference to divisions or sections of the subject under consideration.

2nd and 21st.—Designation of the vessel referred to in the various sections.

3rd.—Size of the ship as determined by displacement at the draft to which it is intended by the constructor that the ship shall be loaded.

4th.—Steaming speed at which the vessel is required to perform the passage.

5th.—Co-efficient of dynamic performance of the vessel by the formula $\frac{V^3 D^{\frac{2}{3}}}{\text{Ind. h.p.}}=C$.

6th.—Consumption of coal per indicated horse power per hour expressed in lbs.

7th.—Co-efficient of dynamic duty with reference to coal consumed by formula $\frac{V^3 D^{\frac{2}{3}}}{W}$ W being the average consumption of coal expressed in cwts. per hour.

8th.—Power required to propel the vessel at the required speed expressed in indicated horse-power and calculated by the formula, indicated horse-power $= \frac{V^3 D^{\frac{2}{3}}}{C}$

9th.—Length of passage to be performed by the ship without re-coaling expressed in nautical miles.

10th.—Weight of hull, including all equipment complete for sea (exclusive of engines, coal, and cargo) taken at 40 per cent. of the load displacement.

11th.—Weight of engines and boilers in working order, including all equipment for sea, taken at the rate of 5cwts. per indicated horse-power.

12th.—Weight of coal required for the passage, calculated on the foregoing data.

13th.—Cargo, as determined by the load displacement less the weight of hull, engines, and coal.

14th.—Investment in the hull of the ship, including rigging, furnishing, and all other equipment complete for sea, taken at £50 per ton weight of hull.

15th.—Investment in the engines, including spare gear and all equipment for sea, taken at £15 per indicated horse-power.

16th.—Total investment in hull and engines.

17th.—Comparative rates of freight or ratios of cost expenses per ton of cargo, being proportional to the investment divided by the tons weight of cargo conveyed.

18th.—Ratios of cost expenses per ton of cargo, with reference to that incurred by ship A, taken as the unit of performance, and which is expressed by the number 100.

19th.—Ratios of cost expenses per ton of cargo with reference to the cost incurred by ship A taken as the unit of performance, and which is expressed by £1 per ton.

20th.—Comparative freight on 100,000 tons of goods, assuming the freight by ship A to be at the rate of £1 per ton of goods conveyed.

21st.—Designations of vessels refered to in the sections.

The table (next page) may be interpreted as follows:—

SECTION A.—Freight, as affected (*cœteris paribus*) by variations of the size of ship.

By reference to the table (next page) it will be observed that as the ship's size (column 3) is reduced from 5,000 tons displacement to 4,000 tons, the expenses per ton of cargo (column 17) become increased in the ratio of 49 to 51, that is, in the ratio of 100 to 104 (column 18), showing an increase of 4 per cent.; or, expressed in money, assuming £1 per ton to be the rate of freight by ship A, of 5,000 tons displacement, the rate by ship A_1, of 4,000 tons displacement will be £1 0s. 10d., and by following the table it appears that the rate of freight by ship A_2, of 3,000 tons, will, as compared with ship A, of 5,000, be increased 8 per cent., amounting to £1 1s. 8d. per ton.

The comparative freight charges on 100,000 tons of goods (column 20) by the vessels A, A_1, A_2, respectively would be £100,000, £104,000, and £108,000.

Thus, in a merely mechanical point of view, and irrespectively of various mercantile and nautical considerations which may limit the size of ships, we see the benefit of performing goods transport service by large vessels in preference to small ones, provided that adequate cargo be always obtained and that no delay be thereby incurred. But it is to be observed that if the 5,000 tons ship A, instead of being loaded with its full cargo of 2,395 tons, be loaded only with the quantity of cargo (1,878 tons) that could be carried by the 4,000 tons ship, A_1, the freight expenses per ton of cargo would, in this case, be enhanced in the proportion of 63 to 49, that is, in the proportion of 128 to 100, or 28 per cent., or, expressed in money in the proportion of £1 4s. 10d. to £1, the same being a higher rate by 24 per cent. than the freight charge at which the 4,000 tons ship, A_1, would perform the service. By pursuing the calculations from the data adduced by the table, it will be found that the economic advantage of the 5,000 tons ship A, as compared with the 4,000 tons ship, A_1, will be entirely sacrificed if its cargo be reduced from 2,395 tons to 2,305 tons, or be only 90 tons, or $3\frac{3}{4}$ per cent., deficient of its full load. Also, as compared with the ship A_2, of 3,000 tons, the advantage of the 5,000 tons ship A, will be lost if its cargo be reduced from 2,395 tons to 2,218, or be only 117 tons deficient of its full load.

Hence it appears that the superior economic capabilities of large ships in a mechanical point of view for the conveyance of goods, may, in a mercantile point of view, be very soon sacrificed by mismanagement in assigning larger vessels for the discharge of mercantile service than is demanded by the trade, notwithstanding the economic superiority of large ships when promptly and fully loaded.

SECTION B.—Freight, as affected (*cœteris paribus*) by variations in the constructive type of form of the hull.

The relative constructive efficiency of mercantile ships in a purely dynamic point of view, as respects type of form (irrespectively of materials and workmanship), is now generally recognised as being determined by their co-efficients (C) of dynamic performance, as deduced from actual trial of the ships, and calculated by the following formula $\frac{V^3 \ D^{\frac{2}{3}}}{\text{Ind.h.p.}}=C$, which may be expressed as follows:—

Multiply the cube of the speed (V^3) by the cube root of the square of the displacement ($D^{\frac{2}{3}}$), and divide the product by the indicated horse-power (Ind. h. p.); the quotient will be the co-efficient (C) of dynamic performance.

To enter upon the various uses to which this formula is applied would be irrelevant to the matter now under consideration. Suffice it to say that the numeral co-efficient obtained as above set forth affords practically a means by which the mutual relations of displacement, power, and speed of a steam ship of given type of form, and of which the co-efficient is known, may (*cœteris paribus*) be deduced, and it affords a criterion indicating, whatever be the size of the ship, the constructive adaptation of its type of form for mechanical propulsion, as compared with other types of form tested by the same rule, the condition of the vessels as respects cleanness of immersed surface, stability, and other essential properties, being assumed to be the same; and we now proceed to show to what extent, under given conditions, freight per ton of goods conveyed is affected by variations of type of form, as represented by variations of the co-efficient of performance.

By reference to the table (Section B), it will be observed that as the co-efficient of dynamic performance is reduced from 250 to 150, the expenses become increased in the ratio of 100 to 132, or 32 per cent., or, assuming the freight by ship A, of which the co-efficient of dynamic performance is 250, to be at the rate of £1 per ton of cargo, the charge by ship B_1, of the same size, but of which the co-

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
									Weight of				Investment.							
Reference.	Designation of Vessels.	Constructor's load displacement.	Steaming speed per hour.	Co-efficient of performance.	Coal per Indicated horse-power per hour.	Co-efficient of economic duty.	Power.	Passage.	Hull and its Equipment complete.	Engines and their equipment.	Coal for the passage.	Cargo.	Hull at £50 per ton weight.	Engines at £15 per Ind. h.p.	Total.	Comparative rates of expenses incurred per ton of cargo.	Comparative ratios, with reference to freight by ship A, taken at 100.	Comparative rates, with reference to freight by ship A, at £1 per ton weight.	Comparative freight charges on 100,000 tons of goods.	Designation of Vessels.
Section.		Tons.	Knots.	$\frac{V^3 D^{\frac{2}{3}}}{\text{Ind h.p.}}$	Lbs.	$\frac{V^3 D^{\frac{2}{3}}}{W.}$	Ind h.p.	N. miles.	Tons.	Tons.	Tons.	Tons.	£	£	£	Investment / Cargo.	Ratios.	£ s. d.	£	
A	A	5,000	10	250	2	14,000	1,170	3,000	2,000	292	313	2,395	100,000	17,550	117,550	49	100	1 0 0	100,000	A
	A_1	4,000	10	250	2	14,000	1,008	3,000	1,600	252	270	1,878	80,000	15,120	95,120	51	104	1 0 10	104,000	A_1
	A_2	3,000	10	250	2	14,000	832	3,000	1,200	208	223	1,369	60,000	12,480	72,480	53	108	1 1 8	108,000	A_2
B	A	5,000	10	250	2	14,000	1,170	3,000	2,000	292	313	2,395	100,000	17,550	117,550	49	100	1 0 0	100,000	A
	B_1	5,000	10	200	2	11,200	1,462	3,000	2,000	365	392	2,243	100,000	21,930	121,930	54	110	1 2 0	110,000	B_1
	B_2	5,000	10	150	2	8,400	1,950	3,000	2,000	487	522	1,991	100,000	29,250	129,250	65	132	1 6 5	132,000	B_2
C	A	5,000	10	250	2	14,000	1,170	3,000	2,000	292	313	2,395	100,000	17,550	117,550	49	100	1 0 0	100,000	A
	C_1	5,000	10	250	3	9,333	1,170	3,000	2,000	292	470	2,238	100,000	17,550	117,550	52	106	1 1 2	106,000	C_1
	C_2	5,000	10	250	4	7,000	1,170	3,000	2,000	292	627	2,081	100,000	17,550	117,550	56	114	1 2 10	114,000	C_2
D	A	5,000	10	250	2	14,000	1,170	3,000	2,000	292	313	2,395	100,000	17,550	117,550	49	100	1 0 0	100,000	A
	D_1	5,000	10	250	2	14,000	1,170	3,000	2,500	292	313	1,895	125,000	17,550	142,550	75	153	1 10 7	153,000	D_1
	D_2	5,000	10	250	2	14,000	1,170	3,000	3,000	292	313	1,395	150,000	17,550	167,550	120	245	2 9 0	245,000	D_2
E	A	5,000	10	250	2	14,000	1,170	3,000	2,000	292	313	2,395	100,000	17,550	117,550	49	100	1 0 0	100,000	A
	E_1	5,000	10	200	3	7,467	1,462	3,000	2,000	365	588	2,047	100,000	21,930	121,930	59	120	1 4 0	120,000	E_1
	E_2	5,000	10	150	4	4,200	1,950	3,000	2,000	484	1,044	1,472	100,000	29,250	129,250	88	179	1 15 10	179,000	E_2
F	A	5,000	10	250	2	14,000	1,170	3,000	2,000	292	313	2,385	100,000	17,550	117,550	49	100	1 0 0	100,000	A
	F_1	4,000	10	200	3	7,467	1,260	3,000	1,600	315	506	1,579	80,000	18,900	98,900	62	126	1 5 2	126,000	F_1
	F_2	3,000	10	150	4	4,200	1,386	3,000	1,200	346	742	712	60,000	20,790	80,790	113	230	2 6 0	230,000	F_2
G	A	5,000	10	250	2	14,000	1,170	3,000	2,000	292	313	2,395	100,000	17,550	117,550	49	100	1 0 0	100,000	A
	G_1	5,000	12	250	2	14,000	2,021	3,000	2,000	505	451	2,044	100,000	30,315	130,315	64	131	1 6 2	131,000	G_1
	G_2	5,000	14	250	2	14,000	3,209	3,000	2,000	802	614	1,584	100,000	48,135	148,135	93	182	1 16 5	182,000	G_2
H	A	5,000	10	250	2	14,000	1,170	3,000	2,000	292	313	2,395	100,000	17,550	117,550	49	100	1 0 0	100,000	A
	H_1	4,000	12	250	2	14,000	1,702	3,000	1,600	425	380	1,595	80,000	25,530	105,530	66	134	1 6 10	134,000	H_1
	H_2	3,000	14	250	2	14,000	2,283	3,000	1,200	571	437	792	60,000	34,245	94,245	119	243	2 8 7	243,000	H_2
I	A	5,000	10	250	2	14,000	1,170	3,000	2,000	292	313	2,395	100,000	17,550	117,550	49	100	1 0 0	100,000	A
	I_1	5,000	12	250	3	9,333	2,021	3,000	2,000	505	677	1,818	100,000	30,315	130,315	72	147	1 9 5	147,000	I_1
	I_2	5,000	14	250	4	7,000	3,209	3,000	2,000	802	1,228	970	100,000	48,135	148,135	152	310	3 2 0	310,000	I_2
K	A	5,000	10	250	2	14,000	1,170	3,000	2,000	292	313	2,395	100,000	17,550	117,550	49	100	1 0 0	100,000	A
	K_1	5,000	12	225	3	8,333	2,245	3,000	2,250	561	751	1,438	112,500	33,675	146,175	102	208	2 1 8	208,000	K_1
	K_2	5,000	14	200	4	5,600	40,12	3,000	2,500	1,003	1,535	0	...	...	...	...	...	...	...	K_2

efficient is 200, will be £1 2s., being an increase of 10 per cent., and the charge by ship B_2, of the same size, but of which the co-efficient is 150, will be £1 6s. 5d., being an increase of 32 per cent., as compared with the rate of freight by ship A, of which the co-efficient is 250.

The comparative freight charges on 100,000 tons of goods by the vessels A, B_1, B_2, respectively, would be £100,000, £110,000, and £132,000.

Seeing, therefore, that variations of the type of form, as indicated by variations of the co-efficient of dynamic performance, even within the limits of 250 and 150, which are of ordinary occurrence in steam shipping, affect the expenses incidental to the conveyance of mercantile cargo under the conditions referred to, and consequently affect the rate of freight to the extent of 32 per cent., the co-efficient of dynamic performance which a ship may be capable of realising, being thus (*cœteris paribus*) a criterion of the economic working of the ship with reference to power, becomes a highly important matter for directorial consideration in the purchasing or disposal of steam ships.

SECTION C.—Freight as affected (*cœteris paribus*) by variations in the working economy of the engines with reference to coal.

The relative working economy of marine engines as respects the consumption of coal per indicated horse-power per hour is evidently an important element for consideration as affecting freight, to illustrate which, it has been assumed that variations in mercantile practice extend from 2lbs. per indicated horse-power per hour to 4lbs. The consumption of so little as 2 lbs. per indicated horse-power per hour is not usually attained, but being now admitted to have been achieved, and such having become a matter of contract stipulation, it may be looked forward to as the probable future consumption on board ship generally, although the ordinary consumption of existing steamers cannot at the present time be rated at less than 4lbs. per indicated horse-power per hour.

By reference to the table (Section C), it appears that under the special conditions of the service under consideration (namely vessels of 5,000 tons displacement employed on a passage of 3,000 nautical miles, and steaming at the speed of 10 knots an hour) by increasing the consumption of coal from 2lbs. to 4lbs. per indicated horse-power per hour, the expense per ton of goods conveyed becomes increased in the proportion of 49 to 56, that is, in the proportion of 100 to 114, being an increase of 14 per cent., or, assuming the freight by the standard ship A, consuming 2lbs. of coal per indicated horse-power per hour, to be at the rate of £1 per ton of cargo conveyed, the rate of freight by ship C_1, consuming 3lbs. per indicated horse-power per hour, will be £1 1s. 2d., being an increase of 6 per cent., and the rate of freight by ship C_2, consuming 4lbs. per indicated horse-power per hour, will be £1 2s. 10d., being an increase of 14 per cent. per ton of goods conveyed under the conditions referred to.

The comparative freight charges on 100,000 tons of goods by the vessels A, C_1, C_2, respectively, would be £100,000, £106,000, and £114,000.

SECTION D.—Freight charge as affected (*cœteris paribus*) by variations in the constructive weight of hull with reference to the size of the ship as determined by the load displacement.

To illustrate this matter it has been assumed that the weight of hull, including the whole equipment complete for sea (exclusive of engines, coal, and cargo) may vary from 40 per cent. of the load displacement to 60 per cent., under which limitations, by reference to table (Section D), it appears that under the special conditions of the service under consideration, by increasing the weight of hull from 40 per cent. of its displacement to 60 per cent., and assuming the cost of the hull to be in proportion to its weight of materials, the expenses or freight charge per ton of cargo conveyed become increased in the proportion of 49 to 120, that is, in the proportion of 100 to 245, being an increase of 140 per cent., or, assuming the freight charge by the standard ship A, of which the weight of hull is 40 per cent. of the load displacement (2,000 tons) to be at the rate £1 per ton of goods conveyed, the rate of freight by ship D_1, of which the weight of hull is 50 per cent. of the load displacement (2,500 tons) will be £1 10s. 7d. per ton, being an increase of 53 per cent. and by ship D_2, of which the weight of hull is 60 per cent., of the load displacement (3,000 tons), the rate of freight becomes £2 9s. per ton, being an increase of 145 per cent. per ton of goods conveyed under the conditions referred to.

The comparative freight charges on 100,000 tons of goods by the vessels A, D_1, D_2, respectively, would be £100,000, £153,000, and £245,000.

Hence, in the construction of steam ships we see the importance of quality of material and excellence of fastening as a means of reducing weight, and the disadvantage that attends heavy-built ships, such as war steamers, for discharging mercantile service. Hence also we see the deficient steaming endurance of high-speed armoured ships, unless built of enormous size, as measured by their load displacement.

SECTION E.—Freight is affected (*cœteris paribus*) by variations in the constructive type of form combined with variations in the working economy of the engines.

By reference to the Table (Section E), it appears, under the special conditions of the service under consideration, that by an inferior type of form as indicated by the co-efficient of performance being reduced from 250 to 150, combined with an inferior construction of engines, as indicated by the consumption of fuel being increased from 2 lbs. to 4 lbs. per indicated horse-power per hour, thereby reducing the co-efficient of dynamic duty (column 7) from 14,000 to 4,200, the expense or freight charge per ton of goods conveyed becomes increased in the ratio of 100 to to 179, being an increase of 79 per cent.; or, assuming the freight charge by the standard ship A, of which the co-efficient of performance is 250 and rate of consumption 2lbs. per indicated h.-p. per hour (giving a co-efficient of dynamic duty 14,000) to be at the rate of £1 per ton of goods conveyed, the rate of freight by ship E_1, of which the co-efficient of performance is 200, and consumption of coals 3 lbs. per indicated horse-power (co-efficient of dynamic duty 7,467) becomes £1 4s. per ton, being an increase of 20 per cent., and by ship E_2, of which the co-efficient of performance is 150, and the consumption of coal at the rate of 4 lbs. per indicated horse-power per hour, (co-efficient of dynamic duty 4,200), the rate of freight becomes £1 15s. 10d., being an increase of 79 per cent. per ton of goods conveyed under the conditions referred to. The comparative freight charges on 100,000 tons of goods by the vessels A, E_1, E_2, respectively, would be £100,000, £120,000, and £179,000.

Hence, in the control of steam shipping, we see the importance of the co-efficient of dynamic duty (column 7), as indicating the economic efficiency of the ship in a mercantile point of view, with reference to the merits of her hull and engine-construction being made a subject of contract stipulation.

SECTION F.—Freight as affected (*cœteris paribus*) by variations in the size of the ship, combined with variations in the constructive type of form and in the working economy of the engines.

By reference to the Table (Section F), it appears, under the special conditions of service under consideration, that by the size of the ship being reduced from 5,000 tons displacement to 3,000 tons displacement, combined with an inferior type of form, as indicated by the co-efficient of performance being reduced from 250 to 150, and an inferior construction of engine, as indicated by the consumption of coals being increased from 2 lbs. to 4 lbs. per indicated h.p. per hour, the expense or freight charge per ton of goods conveyed becomes increased in the ratio of 49 to 113, that is in the ratio of 100 to 230, being an increase of 130 per cent., or, assuming the freight by the standard

ship A of 5,000 tons, of which the co-efficient of performance is 250, and the consumption of coal at the rate of 2 lbs. per indicated horse-power per hour, to be at the rate of £1 per ton of goods conveyed, the rate of freight by ship F_1 of 4,000 tons, of which the co-efficient of performance is 200 and the consumption of coal at the rate of 3 lbs. per indicated horse-power per hour, will be £1 5s. 2d., being an increase of 26 per cent., and by ship F_2 of 3,000 tons displacement, of which the co-efficient of performance is 150 and the consumption of coal at the rate of 4 lbs. per indicated horse-power per hour, the rate of freight becomes £2 6s., being an increase of 130 per cent. per ton of goods conveyed under the conditions referred to.

The comparative freight charges on 100,000 tons of goods by the vessels A, F_1, F_2, respectively, would be £100,000 £126,000, and £230,000.

SECTION G.—Freight as affected (*cœteris paribus*) by variations of the steaming speed at which it is required that the service shall be performed.

It is proposed to illustrate this most important elemental consideration by reference to rates of speed within the range of present practice, namely, from 10 to 14 knots per hour.

By reference to the Table (Section G), it appears that, under the special conditions of the service under consideration, by increasing the speed from 10 to 12 knots per hour, the expense or required rate of freight per ton of goods conveyed becomes increased in the ratio of 49 to 64, that is, in the ratio of 100 to 131, being an increase of 31 per cent.; and by increasing the speed from 10 to 14 knots, the expense, or required rate of freight per ton of goods, becomes increased in the ratio of 49 to 93, that is, in the ratio of 100 to 182, being an increase of 82 per cent. Hence, assuming the freight by the standard ship A, of 5,000 tons, making a passage of 3,000 nautical miles, at 10 knots per hour, to be at the rate of £1 per ton weight of goods conveyed, the rate of freight by ship G_1, steaming at 12 knots per hour, will be required to be £1 6s. 2d. per ton weight of goods conveyed, and the rate of freight by ship G_2, steaming at 14 knots per hour, will be required to be £1 16s. 5d. per ton of goods conveyed. The comparative freight charges on 100,000 tons of goods, by the vessels A, G_1, G_2, steaming at 10, 12, and 14 knots per hour respectively, would be £100,000, £131,000, and £182,000.

Hence we see how onerous are the obligations which usually impose on mail packets a rate of speed higher than that which would be adopted for prosecuting a purely mercantile service; and as no service can be permanently and satisfactorily performed which does not pay, it follows that the inadequacy, if any, of a high-speed postal subsidy must be made up by surcharge on passengers and cargo, and is, therefore, *pro tanto*, a tax upon trade.

SECTION H.—Freight as affected (*cœteris paribus*) by variations of the size of ships combined with variations of steaming speed.

We will suppose the size of ships to be 5,000, 4,000, and 3,000 tons displacement, and the steaming speed to be at the rates of 10 knots, 12 knots, and 14 knots per hour respectively.

By reference to the table (Section H), it appears that, under the special conditions of the service under consideration, by reducing the size of the ship from 5,000 to 4,000 tons, and increasing the speed from 10 to 12 knots per hour, the expense or required freight charge becomes increased in the ratio of 49 to 66, that is, in the ratio of 100 to 134, or 34 per cent.; and, by reducing the size of ship from 5,000 to 3,000 tons, and increasing the speed from 10 knots to 14 knots, the required freight charge becomes increased in the ratio of 49 to 119, that is in the ratio of 100 to 243, being an increase of 143 per cent., or a multiple of 2½ times nearly. Hence, assuming the rate of freight by the standard ship A of 5,000 tons, steaming at 10 knots, to be at £1 per ton weight of goods conveyed, the required rate of freight by ship H_1 of 4,000 tons, steaming at 12 knots, will be £1 6s. 10d., and the required rate of freight charge by ship H_2, steaming at 14 knots per hour, will be at the rate of £2 8s. 7d. per ton weight of goods conveyed.

The comparative freight charges on 100,000 tons of goods by the vessels A, H_1, H_2, respectively, will be £100,000, £134,000, and £243,000.

SECTION I.—Freight as affected by variations of speed combined with variations of the working economy of the engines.

Assuming the rate of speed to be 10 knots, 12 knots, and 14 knots, and the consumption of coal to be 2 lbs., 3 lbs., and 4 lbs. per indicated horse-power per hour respectively, by reference to the Table (Section I.), it appears that by increasing the speed from 10 knots to 12 knots an hour, and the rate of consumption of coal being also increased from 2 lbs. to 3 lbs. per indicated horse-power per hour, the required freight charge becomes increased in the ratio of 49 to 72, that is, in the ratio of 100 to 147, or 47 per cent.; and by increasing the speed from 10 knots to 14 knots per hour, and the rate of consumption of coal being also increased from 2 lbs. to 4 lbs. per indicated horse-power per hour, the required freight charge becomes increased in the ratio of 49 to 152, that is, in the ratio of 100 to 310, being an increase of 210 per cent., or more than trebled. Hence, assuming the expense or required freight charge by the standard ship A, steaming at 10 knots per hour, and consuming 2 lbs. coal per indicated horse-power per hour, to be at the rate of £1 per ton of goods conveyed, the required freight charge by ship I_1, steaming at 12 knots an hour and consuming 3 lbs. of coal per indicated horse-power per hour, will be at the rate of £1 9s. 5d. per ton of goods, and the required freight charge by ship I_2, steaming at 14 knots per hour and consuming 4 lbs. of coal per indicated horse-power per hour, will be at the rate of £3 2s. per ton of goods conveyed. The comparative freight charges on 100,000 tons of goods by the vessels A, I_1, I_2, respectively, would be £100,000, £147,000, and £310,000.

Hence we see how onerous are the obligations of increased speed, if attempted to be performed with engines of inferior construction, as respects economy of fuel.

SECTION K.—Freight as affected (*cœteris paribus*) by variations of the speed, combined with variations in the type of form, working economy of the engines, and weight of hull.

The object of this section is to show the effect, even of small differences, of practical construction, when operating collectively to the detriment of a ship, combined with the obligation of increased speed.

By reference to the Table (Section K) it appears, that under the special conditions of the service under consideration, by increasing the speed from 10 to 12 knots, with a ship of inferior type of form, as indicated by the co-efficient of performance being reduced from 250 to 225, and of inferior engine-arrangement, as indicated by the consumption of fuel being increased from 2 to 3 lbs. per indicated horse-power per hour, the weight of hull being also increased 5 per cent., namely, from 40 per cent. to 45 per cent. of the constructor's load displacement; by this combination, the expense per ton of goods conveyed becomes increased in the proportion of 49 to 102, that is in proportion of 100 to 208, being an increase of 108 per cent., or more than doubled; or, assuming the freight by the standard ship A, to be at the rate of £1 per ton, the rate of freight by ship K_1, under the differences above referred to, becomes £2 1s. 8d., and it is to be observed that if the speed be increased to 14 knots, whilst at the same time the co-efficient of performance is reduced to 200, the consumption of fuel increased from two to four lbs. per indicated horse-power per hour, and the weight of the hull increased 10 per cent., namely, from 40 per cent. of the load displacement to 50 per cent., under these conditions the entire load displacement of the ship K_2 will be appropriated by the weight of the hull, engines, and coal, leaving no displacement whatever available for cargo, that is to say,

the vessel K_2 is utterly unable to perform the conditions of the service as a mercantile steamer.

The comparative freight charges on 100,000 tons of goods by the vessels A and K_1 respectively would be £100,000 and £208,000.

As respects the relation which subsists between the dynamic properties of vessel A, taken as the standard of comparison in the foregoing sections, and the dynamic properties of mercantile steam ships generally at the present time, it might be regarded as invidious to refer to and particularise the actual performances of vessels presently employed on commercial service, but it may be affirmed generally that the ocean performance of mercantile steam fleets does not average a co-efficient of economic duty by the formula $\frac{V^3 D^{\frac{2}{3}}}{W}$ exceeding 5,600, whilst modern naval architecture and engineering has practically shown that with certain types of form the co-efficient of performance may be expected to vary from 250 to 300, and that some engines of modern construction have consumed only from 2 lbs. to 2½ lbs. of coal per indicated horse power per hour, thus practically constituting a possible co-efficient of economic duty as high as 14,000, which has therefore been assigned to ship A in the foregoing table, and whereby, under the conditions of the service referred to, viz., ships of 5,000 tons displacement steaming at 10 knots per hour on a passage of 3,000 miles, the conveyance of goods per ton weight may be expected to be performed at fully 30 per cent. less cost than would be necessarily incurred under the same circumstances by vessels of the same size, but of which the co-efficient of economic duty does not exceed 5,600, and this comparative difference would be greatly exceeded if the size of ships be reduced, the length of passage increased, or the speed accelerated.

From the foregoing statements it appears that public interests in the great matter of FREIGHT demand that steam ships only of the most effective construction, as respects hull and engines, be employed on mercantile service. Bad types of hull and wasteful engines necessarily, as we have seen, enhance freight, increase the cost of production, and consequently curtail consumption, thus constituting a blight on national industry. A check on these evils, highly conducive to the gradual reduction of freight expenses by steam ships, would at once be instituted by making it a matter of *contract stipulation*, that a definite co-efficient of DYNAMIC DUTY, by the formula $\frac{V\ D^{\frac{2}{3}}}{W}$, should be realised on test trial of the ship, at the builder's load displacement and steaming at the stipulated speed. Unquestionably, for years past, in our popular marine engineering, prejudice and expediency have retarded progress; marine engineering practice has not duly availed itself of the established truths and science of the times; expansion, superheating, and surface condensation, now being reanimated as the basis of modern improvements, are but the legacies of a by-gone age hitherto neglected.

It is only by directing public opinion to bear on such subjects of general interest, that any prevalent evil can be corrected; and surely an appeal on the important subject of "freight," as affected by differences in the dynamic properties of steam ships, cannot be more appropriately made to any public body than to the British Association, under the presidency of a man especially distinguished and honoured in the path of practical science, and assembled at Manchester, the birth place of free trade, and the manufacturing capital of the world.

CHAS. ATHERTON,
Chief Engineer, H.M. Dockyard, Woolwich.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The Thirty-first Annual Meeting of this Association commenced on Wednesday, the 4th of September, at Manchester. The following is a summary of the proceedings of the Association, continued from last week:—

In the sections the following papers were read:—

ON THURSDAY, SEPTEMBER 5th.

SECTION A.—MATHEMATICAL AND PHYSICAL SCIENCE.

President's Address.

Warren De la Rue—Report on the Progress of Celestial Photography since the meeting at Aberdeen.

J. H. Gladstone—On the Distribution of Fog round the British Isles.

C. W. Siemens—On an Electric Resistance Thermometer, with balancing coil.

Thomas Sutton—On a Panoramic Lens.

Daniel Vaughan—Cases of Planetary Instability, indicated by the appearance of Temporary Stars.

William Vivian.—Observations on the Structure of Copper, as seen with a microscope.

Charles Tomlinson—On Lightning Figures.

SECTION B.—CHEMICAL SCIENCE.

1. Opening Address by the President.
2. Report on the Manufactures of the South Lancashire District.
3. Dr. Andrews—On the Effect of Great Pressure combined with Cold on the Six Non-condensible Gases.
4. Dr. Joule and Professor W. Thomson—On the Thermal Effects of Elastic Fluids.

SECTION C.—GEOLOGY.

Opening Address of the President, Sir R. I. Murchison.

E. W. Binney—Sketch of the Geology of Manchester.

W. Pengelly—On the Recent Encroachments of the Sea on the Shores of Torbay.

James Yates—On the Excess of Water in the Region of the Earth about New Zealand; its Causes and Effects.

Charles Moore—Notes on Two Ichthyosauri, to be exhibited to the Meeting.

J. G. Marshall—On the Relation of the Eskdale Granite at Black Comb to the Schistose Rocks.

SECTION D.—ZOOLOGY AND BOTANY.

Professor Owen, F.R.S.—On the Vertebræ of the Mole, *Talpa europœa, L.*

Professor Owen, F.R.S.—On some Objects of Natural History, from the Collection of M. Du Chaillu.

Professor Wyville Thomson, LL.D.—Observations on the Development of *Synapta inhœrens.*

J. Gwyn Jeffreys, F.R.S.—Exhibition Specimens of the *Sphœnotrochus borealis* of Fleming, from Zetland.

Dr. Ogilvie—Report of the Dredging Committee on the North and East Coasts of Scotland.

Dr. Thomas Alcock—On the Anatomical Characters of *Cypræa.*

M. T. Masters, F.L.S.—On the Relation between Pinnate and Palmate Leaves.

Dr. Dickie—Report on the Flora of the North of Ireland.

SUB-SECTION D.

George Robinson, M.D.—On the Connection between the Functions of Respiration and Digestion.

Edward Smith, M.D., F.R.S., and J. R. Milner, Esq.—Report on the influence of prison dietary and punishments upon the bodily functions of prisoners.

Professor H. Müller—On the existence and arrangement of the fovea centralis retinæ in the eyes of animals.

Charles Kidd, M.D.—On chloroform accidents, and some new physiological facts as to their explanation and removal.

John Davy, M.D., F.R.S.—On the action of lime on animal matter.

SECTION E.—GEOGRAPHY AND ETHNOLOGY.

By the President—On the Connexion between Ethnology and Physical Geography.

Major-General Sir H. C. Rawlinson, K.C.B.—On the Direct Overland Telegraph from Constantinople to Kurrachi.

James Ramsay, Esq.—Remarks on the Proposal to Form a Ship Canal between East and West Loch Tarbert, in Argyllshire.

Louis Kr. Daw, of Christiania—On the Ethnology of Finnmark, in Norway.

SECTION F.—ECONOMICAL SCIENCE AND STATISTICS.

T. Bazley, M.P.—A Glance at the Cotton Trade.

Alderman Neild—On the Price of Printing Cloth and Upland Cotton from 1812 to 1860.

John Strang, LL.D.—On the Altered Condition of the Embroidery Manufacture of Scotland and Ireland since 1857.

Henry Ashworth—On the Connection and Improvements in Cotton Bleaching, with Improvements in the Condition of the Factory Population.

Professor Rogers, M.A.—Prices in England, 1582-1620, and the effect of the American Discoveries upon them during that Period.

SECTION G.—MECHANICAL SCIENCE.

The President of the Section delivered the Opening Address.

Mr. Oldham—Report on Progress of Steam Navigation at Hull.

Mr. Atherton—On Freight as affected by difference in the Dynamic Performance of Steam Ships.

Dr. Crace Calvert—On some Woods employed in the Navy.

At 8 o'clock a *Soirée* was held in the Free-Trade Hall; the chief feature of the evening was a large display of miscroscopes.

FRIDAY, SEPTEMBER 6TH.

SECTION A.—MATHEMATICAL AND PHYSICAL SCIENCE.

J. Glaisher—Report on Luminous Meteors.

W. Von Haidinger—An attempt to explain the earlier Physical Condition of Meteorites, as well as some of the phenomena attending their fall on our planet.

R. P. Greg—Observations on the preceding communication.

J. P. Gassiot—On the deposit of the Metal which takes place from the Negative terminal of an Induction Coil during the Electrical Discharge in vacuo.

B. Price—On the apparent Path of a Projectile, as affected by the Rotation of the Earth.

W. Spottiswoode—On the Canonical Form of the Decadic Binary Quantic.

W. Spottiswoode—On Petzval's Asymptotic method of solving Differential Equations.

J. Alexander Davies—Observations on the production of Colour by the Prism; the passive mental Effect or Instinct in comprehending the enlargement of the Visual angle and other optical problems.

John Smith—The Chromascope, and what it reveals.

John Smith—The Prism and Chromascope.

John Smith—An Experiment; being an attempt to illustrate the Roseate Phenomena seen during a total eclipse.

SECTION B.—CHEMICAL SCIENCE.

The President—Exhibited some Photographs of different spectra, and read a paper on the subject.

Dr. J. H. Gladstone—On the emission and absorption of rays of Light by certain Gases.

Dr. J. H. and Mr. G. Gladstone—On an Aluminous Mineral from the Upper Chalk near Brighton.

Dr. Crace Calvert—On the Chemical Composition of some Woods employed in the Navy.

Dr. Crace Calvert—On the Chemical Composition of Steel.

Dr. W. Roberts—On the solvent powers of weak and strong solutions of alkaline carbonates on Uric Acid Calculi.

Dr. Smith (of Sydney)—On certain difficulties in the way of separating Gold from Quartz.

SECTION C.—GEOLOGY.

Professor Owen—On a Dinosaurian Reptile (*Scelidosaurus Harrisoni*) from the Lower Lias of Charmouth.

Professor Owen—On the remains of a Plesiosaurian Reptile (*Plesiosaurus Australis*) from the Oolitic formation in the Middle Island of New Zealand.

Harry Seely—On the Elsworth Rock and of the Clay above it.

Professor Harkness—On the Sandstones and their associated deposits of the Valley of the Eden and the Cumberland Plain.

Rev. W. S. Symmonds—On some Phenomena connected with the Drifts of the Severn, Avon, Wye, and Usk.

George W. Morton—On the Pleistocene Deposits of the District about Liverpool.

Professor Phillips—Notice of some Facts in Relation to the Post-glacial Gravels of Oxford.

SECTION D.—ZOOLOGY AND BOTANY.

J. Gwyn Jeffreys—Report of the results of Deep Sea Dredging in Zetland, with a notice of several species of Mollusca, new to science or to the British Isles.

Rev. A. M. Norman—Some results of Deep Sea Dredging in Zetland.

Dr. Collingwood and S. Byerley—Preliminary Report of the Committee for Dredging the Mersey and the Dee.

R. Macandrew—Report of the General Dredging Committee.

P. L. Sclater—Report of the present state of our knowledge of the species of the Apteryx, living in New Zealand.

P. L. Sclater—Preliminary Report on the present state of our knowledge of the terrestrial Vertebrata of the West Indies.

Dr. Daubeny—On the influence exerted by Light on the Functions of Plants.

Dr. Daubeny—On a Violet peculiar to the Calamine Rocks in the neighbourhood of Aix la Chapelle.

Dr. Daubeny—On the Functions discharged by the Roots of Plants.

Rev. T. Hincks—Notes on the Ovicells of the Polyzoa, with reference to the views of Professor Huxley.

SUB-SECTION D.

James Turnbull, M.D.—On the Physiological and Medicinal Properties of Sulphate of Aniline, and its use in the Treatment of Chorea.

E. Smith, M.D., F.R.S., and J. R. Milner, Esq.—Report of the Influence of Prison Dietary and Punishments upon the Bodily Functions of Prisoners. Part Second.

Joseph Toynbee, Esq., F.R.S.—The Action of the Eustachian Tube in Man, as Demonstrated by Dr. Politzer's Otoscope.

John Davy, M.D., F.R.S.—On the Blood of the Common Earthworm.

George Rolleston, M.D., F.R.S.—On certain points in the Anatomy of the Isnsectivora.

Professor Remak—Upon the Influence of the Sympathetic Nerve on Voluntary Muscles, as witnessed in the Treatment of Progressive Muscular Atrophy by Secondary Electric Currents.

Lionel Beale, M.B., F.R.S.—On the Structure and Growth of the Elementary Parts (cells) of Living Beings.

SECTION E.—GEOGRAPHY AND ETHNOLOGY.

Henry Wise, Esq.—Remarks on a proposed Railway across the Malay Peninsula.

Captain Cameron, H.B.M. Consul at Massonah—Notices on the Ethnology, Geography, and Commerce of the Caucasus.

P. B. Du Chaillu, Esq.—On the Geography and Natural History of Western Equatorial Africa.

James Hunt, Ph.D., F.S.A.—On the Acclimatisation of Man.

Section F.—Economic Science and Statistics.

The President delivered the opening Address (adjourned from yesterday).

David Chadwick.—On the Progress of Improvements in Manchester and Salford during the last twenty years.

J. Watts, Ph. D.—On Strikes.

Edmund Potter, F.R.S.—On Co-operation and its Tendencies.

Daniel Stone, F.C.S.—On the Rochdale Co-operative Societies.

Rev. W. R. Thorburn, M.A.—Co-operative Stores: Their Bearing on Athenæums, &c.

Rev. W. N. Molesworth—On the Progress of Co-operation at Rochdale.

Section G.—Mechanical Science.

J. Scott Russell, F.R.S.—Report of the Committee on Steam Ship Performance.

James Heywood, M.A., F.R.S.—Report of the Committee on the Patent Laws.

Mr. Hughes—Resolutions passed at a Meeting of the Manchester Patent Law Reform Association, held August 30th, 1861.

Sir W. G. Armstrong, F.R.S.—On the Patent Laws.

Thomas Webster, F.R.S.—On Property in Inventions, and its effect on Arts and Manufactures.

R. A. Macfie—On Patents, considered internationally.

W. Spence—On Patent Tribunals.

At 8 o'clock a *Soirée* took place in the Free-Trade Hall; a discourse was delivered by Professor Miller, M.D., F.R.S., King's College, London, " On the Spectrum Discoveries of Bunsen and Kirschoff.

SATURDAY, SEPTEMBER 7th.

Section A.—Mathematical and Physical Science.

Gen. Sabine—Provisional Report on the Magnetic Survey of Great Britain.

G. T. Stoney—On the Amount of Direct Magnetic Effect of the Sun or Moon upon Instruments at the Earth's Surface.

The President—On the Laws of the Principal Diurnal Inequalities, Solar and Lunar, of Terrestrial Magnetic Force, as deduced from Ten Years' Observations at Greenwich, and on their apparent causes.

The President—On Spontaneous Terrestrial Galvanic Currents.

Prof. Hennessey—On a Probable Cause for the observed Diurnal Variation of Dip and Declination.

Rev. E. Hincks—On the Quantity of the Acceleration of the Moon's Mean Motion, as indicated by the Records of certain Ancient Eclipses.

Rev. H. Lloyd—On the Secular Changes of Terrestrial Magnetism, and their connexion with Disturbances.

Archibald Smith and F. J. Evans—On the Effect produced on the Deviations of the Compass by the Length and Arrangement of the Compass Needles.

J. J. Sylvester—On the Involution of Axes of Rotation.

A. Cayley.—On Curves of the Third Order.

M. Bierens de Haan—On Definite Integrals.

Section B.—Chemical Science.

Dr. Moffat.—On Atmospheric Ozone.

Dr. Moffat.—On Sulphuretted Hydrogen as a Product of Putrefaction.

Professor Galloway—On the Composition and Valuation of Superphosphates.

Professor Delffs—On Morin, and the Non-existence of Moro-tannic Acid.

Professor Anderson—On the Constitution of Paranaphthaline or Anthracine, and some of its Decomposition Products.

G. C. Foster—On Piperic and Hydropiperic Acids.

Section C.—Geology.

W. Pengelly—On a New Bone-Cave at Brixham.

T. W. Barrow—Remarks on the Bone-Caves of Craven.

W. Whincopp.—On the Red Crag Deposits of the County of Suffolk.

W. H. Baily—Palæontological Remarks on the Silurian Rocks of Ireland.

A. B. Wynne—On the Geology of Knockshigowna, County Tipperary.

Robert Scott, M.A.—On the Granite Rocks of Donegal, and the Minerals associated therewith.

T. A. Readwin—On the Gold of North Wales.

Dr. Hagen—Comparison of Fossil Insects of En gland and Bavaria.—Communicated by Mr. Stainton.

Section D.—Zoology and Botany.

H. Fawcett—On the Method of Investigation pursued by Mr. Darwin, in his Treatise on the Origin of Species.

Dr. Collingwood—A Scheme to induce the Mercantile Marine to aid in the Advancement of Science, by the intelligent Collection of Objects of Natural History.

L. H. Grindon—On the Flora of Manchester.

Dr. G. Gibb—On the arrest of Puparial Metamorphosis of *Vanessa antiopa*.

Dr. J. Cleland—On the Anatomy of *Orthagoriscus molá*.

A. Stansfield—On new British Species of *Blechnum*.

Sub-Section D.

Lionel Beale, M.B., F.R.S.—On the Structure and Growth of the Elementary Parts (cells) of Living Beings.

John Davey, M.D., F.R.S.—On the Question whether the hair is or is not subject to Sudden change in Colour.

B. W. Richardson, M.D.—Physiological Researches on Resuscitation.

Prof. Rolletson, M.D., F.L.S.—On some Points in the Anatomy of Insectivora.

A. Hancock—On certain Points in the Anatomy and Physiology of the Dibranchiate Cephalopods.

R. Garner, Esq.—Observations on the Encephalon in Mammalia.

Chas. Robinson, Esq.—On the Occipital Vertebra in Osseous Fishes.

Section E.—Geography and Ethnology.

Professor Owen, F.R.S., &c.—On the Osteology and Dentition of the Natives of the Andaman Islands.

A Letter from the Colonial Office, on the Exploration of N.W. Australia, under Mr. Gregory.—Communicated by Sir R. I. Murchison.

Sir R. I. Murchison—An Appeal on behalf of the only son of the great traveller, Thomas Atkinson, Esq., F.R.G.S.

A Letter from Sir Hercules Robinson, Governor of Hong Kong, relating to the progress of Major Sard, Captain Blackiston, and others, who are endeavouring to pass from China to the North of India.—communicated by Sir R. I. Murchison, V.P.R.G.S.

Dr. Beke, F.R.G.S.—On the Mountains forming the Eastern side of the Basin of the Nile, and the Origin of the Designation, " The Mountains of the Moon ;" with a Notice of a Recent Volcanic Eruption in the Red Sea.

P. O'Callaghan, Esq., B.A., Sec. of Philosophical Society of Leeds—Cromleachs and Rocking Stones considered Ethnologically.

Bath C. Smart, Esq.—Remarks on the English Gipsies and their Dialects.

Section F.—Economic Science and Statistics.

John Shuttleworth—Some Account of the Manchester Gasworks.

Miss Twining—On the Employment of Women in Workhouses.

Colonel Sykes, M.P., F.R.S.—Notes on the Progress and Prospects of the Trade of England with China since 1833.

Frederick Purdy—On the Relative Pauperism in England, Scotland, and Ireland, 1851—1860.

William Westgarth—The Commerce and Manufactures of the Colony of Victoria.

William Farr, M.D., D.C.L., F.R.S.—On the Recent Improvements in the Health of the British Army.

J. T. Danson—On the Growth of the Human Body in Height and Weight in Males from 17 to 30 years of age.

Section G.—Mechanical Science.

Dr. Eddy—Proposal for a Class of Gun Boats capable of engaging Armour Plated Ships at Sea; accompanied with suggestions for fastening on Armour Plates.

Capt. Blakeley—Artillery *versus* Armour.

Wm. Fairbairn, F.R.S. (The President of the Association)—Results of Experiments on Targets, at Shoeburyness.

E. J. Reed—On the Iron Cased Ships of the British Admiralty.

Theo. Aston—On Enlarged Projectiles for Rifled Firearms.

At 8 o'clock a *Soirée* was held in the Free-Trade Hall, where a magnificent display of telegraphic instruments was collected and shown in action. A discussion upon the collection was delivered by W. R. Grove, Q.C., F.R.S.

MONDAY, SEPTEMBER 9.

Section A.—Mathematical and Physical Science.

The Astronomer Royal commenced the business of the Section by making remarks on Dr. Hinck's Paper, on Saturday, on the acceleration of the Moon's Mean Motion, as indicated by records of ancient Eclipses.

Fleeming Jenkin—On Permanent Thermo-electric Currents in Circuits of one Metal.

Sir David Brewster—On Binocular Lustre.

Report from the Balloon Committee.

Professor Hennessy—Provisional Report on the present state of our knowledge as to the Transmission of Sound Signals during Fogs at Sea.

Professor Hennessy—On the connection between Storms and Vertical Disturbances of the Atmosphere.

J. Glaisher—On a Deep Sea Pressure Guage—On a Deep Sea Thermometer—On a Daily Weather Map—On Admiral Fitzroy's Paper presented to Section A, relative to the Royal Charter Storm—On some Meteorological Documents relating to Mr. Green's Balloon Ascents.

W. Hopkins—On the Theories of Glacial Motion.

E. J. Lowe—On the Great Cold of Last Christmas, and its Destructive Effects.

Sir David Brewster—On the Compensation of Impressions Moving Over the Retina.

Sir David Brewster—On Photographic Micrometers.

C. W. Siemens—On the Bathometer—an Instrument to Indicate the Depth of the Sea, without Submerging a Line.

Balfour Stewart—On the Photographic Records given at the Kew Observatory of the great Magnetic Storm of the end of August and the beginning of September, 1859.

Balfour Stewart—On the New Mininum Mercurial Thermometer proposed by Mr. Casella.

Section B.—Chemical Science.

Professor Tomlinson—On the cohesion figures of Liquids.

Dr. Voelcker—Report on field experiments and laboratory researches on the Constituents of Manures essential to Cultivated Crops.

Dr. Voelcker—On the Composition of Crystallised Moroxite, from Gumillo, near Alicante.

J. B. Lawes, F.R.S., and Dr. J. H. Gilbert, F.R.S.—On some points in connection with the Exhaustion of Soils.

H. Deane—On a Particular Decomposition of Ancient Glass.

Dr. Wallace—On the Composition and Properties of the Water of Loch Katrine, as supplied to Glasgow.

Dr. Stevenson Macadam—On the Proportion of Arsenic present in Paper-hangings.

Dr. Stevenson Macadam—On the Proportion of Tin present in Tea Lead.

Section C.—Geology.

Sir R. I. Murchison—Exhibited Maps and Sections recently published by the Geological Survey.

Sir R. I. Murchison—Communicated the Results of the Geological Survey of Tasmania, by C. Gould, with Maps.

Henry Green.—On the Faults of the Lancashire Coalfield.

Edward Hull—On Isometric Lines, and the relative distribution of the Calcareous and Sedimentary Strata of the Carboniferous Rocks.

Prof. Harkness—On the Old Red Sandstone of South Perthshire.

Rev. Dr. Anderson—Report on Dura Den.

A. Bryson—On the Aqueous Origin of Granite.

W. Pengelly—On the Age of the Dartmoor Granites.

Section D.—Zoology and Botany.

P. P. Carpenter—Notes on the Variations of *Tecturella grandis*.

P. P. Carpenter—On the Cosmopolitan Operations of the Smithsonian Institution.

Dr. J. E. Gray—Letter in reference to the death-wound of the large Gorilla recently purchased from M. Du Chaillu by the Trustees of the British Museum.

H. T. Stainton—On a New Mining-larva recently discovered.

Rev. T. Hincks—On the Development of the Hydroid Polyps, *Clavatella* and *Staurıdea;* with remarks on the relation between the Polyp and its Medusoid, and between the Polyp and the Medusæ.

J. Couburn—On the Culture of the Vine in the Open Air.

W. Danson—On Barraguta Cotton from the Plains of the Amazon, and on the Flax-fibre Cotton of North America.

Sub-section D.

R. Garner—Observations on the Encephalon of Mammalia.

Dr. Mouat—On Prison Dietary.

Professor Hyrtl—On Nerves without end; communicated by Dr. Percival Wright.

Professor Hyrtl—On the Pneumatic Processes of the Occipital Bone; communicated by Dr. Percival Wright.

Professor Hyrtl—On portions of Lungs without Blood-vessels; communicated by Dr. Percival Wright.

Professor Rolleston—On some points in the Anatomy of Insectivora.

Section E.—Geography and Ethnology.

John Crawfurd, Esq., President—On the Antiquity of Man, from the Evidence of Language.

R. Cull—On the Antiquity of the Aryan Languages.

Rutherford Alcock, C.B., F.R.G.S., H.B.M. Minister in Japan.—Journey in the Interior of Japan, with the Ascent of Fusiyama.

R. Wollaston, M.D.—On some Account of the Romans in Britain.

Col. Shaffner, U.S.—Spitzbergen Current, and Active and Extinct Glaciers in South Greenland.

W. P. Snow—On the Geological Science of Arctic Explorations, and the Advantage of Continuing it.

Section F.—Economic Science and Statistics.

William Newmarch, F.R.S.—On the Extent to which Sound Principles of Taxation are embodied in the Legislation of the United Kingdom.

Professor J. E. T. Rogers, M.A.—On the Definition and Incidence of Taxation.

C. E. Macqueen—The True Principles of Taxation.

W. Clarke, M.D.—On a Revision of National Taxation.

Rev. Canon Richson, M.A.—The Income Tax.

Richard Valpy.—The Commercial Relations between England and France.

H. J. Ker Porter—To present Engravings of Farm Labourers Cottages, with a Specification, and a Few Remarks in continuation of a Paper read at Oxford in 1860.

Mrs. Fison.—On Sanitary Improvements.

Rev. W. Caine—Ten Years' Statistics of the Mortality amongst the Orphan Children taken under the care of the Dublin Protestant Orphan Societies.

Charles Thompson—On some Exceptional Articles of Commerce and Undesirable Sources of Revenue.

Section G.—Mechanical Science.

Charles Vignoles, F.R.S.—On Iron Construction, with remarks on the Strength of Iron Columns and Arches. By F. W. Shields.

B. H. Stoney.—On the Deflection of Iron Girders.

Edward T. Bellhouse—On the Applications of the Hydraulic Press.

John Robinson—On the Application of Workshop Tools to the Construction of Steam-Engines and other Machinery.

W. B. Johnson—On the Application of the Direct-Action Principle.

Professor Macquorn Rankine—On the Resistance of Ships.

At three o'clock the General Committee met, W. Fairbairn, Esq., F.R.S., in the chair, for the purpose of fixing the place of meeting for next year, electing the President, and other business of the Association. Cambridge was selected as the place of meeting for next year, and the Rev. Robert Willis, F.R.S., Jacksonian Professor of Natural Philosophy in that University, was chosen to fill the office of President. In the evening, at 8 o'clock, G. B. Airy, Esq., F.R.S., Astronomer Royal, announced a discourse, in the Free-Trade Hall, "On the Solar Eclipse of last year."

TUESDAY, SEPTEMBER 10th.

Section A.—Mathematical and Physical Science.

Balfour Stewart—Report on the Theory of the Exchanges of Heat.

Robert Mallet—Report on Earthquake Wave Experiments.

Professor H. J. S. Smith—Report on the Theory of Numbers.

Sir D. Brewster—On the Optical Study of the Retina.

J. S. Stuart Glennie—On the Application of the Principle of the Conservation of Force to the Mechanical Explanation of the Correlation of Forces.

J. S. Stuart Glennie—On the Resistance of the Ether to the Comets and Planets, and on the Rotation of the latter.

Professor Phillips.—Notes of Sketches of Parts of the Surface of the Moon.

W. R. Birt—Contributions to the Report on Selenography.

Rev. T. Rankin—Meteorological Observations.

W. S. Jevons—On the Deficiency of Rain in an Elevated Rainguage, as caused by Wind.

The President of the Association—Remarks on the Temperature of the Earth's Crust, as Exhibited by Thermometrical Returns obtained during the Sinking of the Deep Mine at Dukinfield.

Isaac Ashe—On the Causes of the Phenomena of Cyclones.

Dr. Morgan—On a New Registering Anemometer, invented by Dr. Morgan.

P. J. Livsey—On the New Barometer invented by Mr. R. Howson.

Section B.—Chemical Science.

J. J. Griffin, F.C.S.—On the Construction of Gas-burners for Chemical use.

Professor Roscoe—On Perchloric acid and its hydrates.

W. H. Hurst—Note on the Sulphur compound formed by the action of Sulphuretted Hydrogen on Formiate of lead at a high temperature.

Drs. Russell and Matthiessen—On vesicular structure in Copper.

W. Gossage—On the History of the Alkali Manufacture.

Dr. Daubeny—On the Evolution of Ammonia from Volcanoes.

Drs. Williamson and Russell—On an Apparatus for the Rapid Separation and Measurement of Gases.

J. Mercer—On Madder Photographs.

Professor Tennant—On a specimen of Meteoric Iron from Mexico.

Dr. J. H. Lloyd—On purifying towns from Sewage by means of dry Cloacæ.

Dr. Stevenson Macadam—On an economical mode of boiling Rags, &c., with alkaline ley.

Dr. Voelcker—On the action of Rennet on Milk.

Dr. Voelcker—On natural combinations of Phosphates with Alkalies.

Wm. Marriott—On the separation of Ammonia from Coal Gas.

Section C.—Geology.

J. W. Salter—On the Nature of Sigillariæ, and on the Bivalve Shells of the Coal.

Dr. Hector—On the later Changes in the Physical Geology of British North America, with Notes on the Auriferous Drifts of the Pacific Slope.

Dr. Hector—On the Age and Distribution ef the Mesozoric Coal of the Pacific Coast and Saskatchewan Prairies.

David Milne Home—Notice of Elongated Ridges of Drifts, common in the South of Scotland, called *Kains*.

T. A. Readwin—On the Gold of North Wales.

J. T. Wilkinson and J. Whitaker—On the Burnley Coal Field and its Fossil Contents.

W. Patterson—On Certain Markings in Sandstones.

Rev. C. R. Gordon—On the Laws Discoverable as to the formation of Land on the Globe.

Section D.—Zoology and Botany.

Dr. Jessen—Notice of the Absorbing power of the Roots of Plants.

A. Hancock—On certain points in the Anatomy and Physiology of the Dibranchiate Cephalopods.

Tuffen West—On some point of Interest in the Structure of Spiders.

P. L. Sclater—Remarks on the late increase in our knowledge of the Struthious Birds.

Rev. A. R. Hogan—On *Daphina Schaefferi* and other Freshwater Crustacea.

Rev. H. H. Higging—On the Arrangement of Hardy Herbaceous Plants adopted in the Botanic Gardens, Liverpool.

T. M. Mitchell—On the Migration of the Herring.

C. W. Peach—Report on the Herring Fishery.

Sub-Section D.

Dr. Cleland—On a method of Craniometry, with Observations on the varieties of form of the Human Skull.

Dr. Ed. Smith, F.R.S.—On the Influence of the Season of the Year on the Human System.

Professor Rolleston—On the Anatomy of Pteropus.

Professor Rolleston—On the Homologies of the Lobes of the Liver in Mammalia.

Dr. Richardson—Physiological Researches on the Artificial Production of Cataract.

Dr. J. D. Morrel—The Physeal and Physiological Processes involved in Sensation.

Section E.—Geography and Ethnology.

Sir E. Belcher—Remarks on the Glacial Movements noticed in the vicinity of Mount St. Elias, on the North-west Coast of America.

P. B. Du Chaillu—On the People of Western Equatorial Africa.

Rev. A. Hume, D.C.L., LL.D.—On the Relations of the Population in Ireland, as shown by the Statistics of Religious belief.

Henry Duckworth, F.R.G.S.—On the New Route to Western China.

James Hector — M.D., F.R.S.— On the Capabilities for Settlement of the central parts of British North America.

Hon. J. Baker, F.R.G.S.—On Australia, including the recent Explorations of Mr. Macdonald Stuart.

Wm. Bollaert, F.R.G.S.—The great Earthquake at Mendoza, 20th March, 1861.

Section F.—Economic Science and Statistics.

James Heywood, F.R.S.—On the Inspection of Endowed Educational Institutions.

Captain Donnelly, R.E.—On the Government System of Examinations in Science.

J. T. Hammack, F.S.S.—On the General Results of the Census of the United Kingdom in 1861.

John Strang, LL.D.—Comparative Progress of the English and Scottish Population, as shown by the Census of 1861.

T. A. Welton—An Examination of the Increase and Decrease of Population in England and Wales, 1851-61.

R. H. Bakewell, M.D., M.R.C.S.—On the Influence of Density of Population on the Fecundity of Marriages in England.

Rev. A. Hume, D.C.L.—On the Condition of National Schools in Liverpool, as compared with the Population, 1861.

Henry Fawcett, M.A.—On the Economical Effects of the Gold Discoveries.

Profesor J. E. T. Rogers, M.A.—Can Patents be defended on Economical Grounds?

Henry Ashworth—On Capital Punishments and Crime.

Section G.—Mechanical Science.

Professor James Thompson—Report of Experiments on the Gauging of Water.

Wm. Fairbain, F.R.S. (President of the Association)—On the Effects of Vibratory Action and long-continued Changes of Load upon Wrought-Iron Bridges and Girders.

David Chadwick—On Recent Improvements in Cotton Gins.

J. F. Bateman, F.R.S. (President of the Section)—On Street Pipe Arrangements for Extinguishing Fires.

C. W. Siemens—On Railway and Fire Alarms.

G. Arnott, M.D.—On the Prevention of Railway Accidents.

Col. Sir Henry James, R.E.—On Photozincography; with copies of Doomsday Book.

Mr. Haworth—On a Perambulator and Street Railway.

T. Dobson, B.A.—On Explosions in Coal Mines.

Messrs. Silver—On Telegraphic Wires.

William Tate—On Bailey's Steam Pressure Guage.

James Higgins—On Railway Brakes.

Peter Effertz—On Brickmaking Machinery.

Septimus Mason—On a Locomotive for Common Roads.

T. Symes Prideaux—On Economy in Fuel.

S. Bateson—On an Improved Feed Water Heater, for Locomotive and other Boilers.

Andrew Henderson—A.I.C.E., F.R.S.—On Steam Navigation on the Rivers and Coasts of India and China.

At 8 o'clock a *Soirée* was held in the Free-Trade Hall, when a display of natural objects was provided by the Field Naturalists Association of Manchester. A discourse, explanatory of the collection, was delivered by Edwin Lankester, Esq., M.D., F.R.S.

WEDNESDAY, SEPTEMBER 11.

Section A.—Mechanical and Physical Sciences.

Latimer Clark and Sir Charles Bright—On Standards of Measurement of Electrical Quantities and Resistances.

Professor W. Thomson—Physical considerations regarding the possible Age of the Sun's Heat—Communicated by Professor Rogers.

J. W. Brown—On the supposed Connexion of Meteorological Phenomena and Magnetic Variation.

Sir W. Rowan Hamilton—On Geometrical Nets in Space

C. F. Ekman—An Enquiry into the Fundamenta Principles of Algebra, chiefly with regard to negative and imaginary quantities.

Rev. T. P. Kirkman—On Roots of Substitutions.

W. L. Russell—On the Calculus of Functions, with some remarks on the Theory of Electricity.

T. Dobson—On the Symmetrical Form of the Properties of the Plane Triangle.

T. Rose—On Presentations of Colour under novel conditions.

W. Danson—On the Laws of Universal Storms.

Rev. P. Walton—On some Signs of Changes in the Weather.

H. W. Crawley—Remarkable Phenomena observed in the Sun in Nova Scotia.

G. J. Symons—On British Rainfall.

J. T. Goddard—On the Cloud Mirror and Sunshine Recorder.

M. N. Adler—On the Almanack.

J. J. Walker—Observations on an Iris in Water near Sunset.

W. T. Shaw—Method of Interpreting some of the Phenomena of Light.

Section C.—Geology.

Sir R. I. Murchison—To communicate information from Haidinger, respecting the present state of the Imperial Geological Institution of Vienna.

Mr. Richardson, C.E.—On the Details of the Carboniferous Limestone, as laid open by the railway cutting and tunnel near Almondsbury, N. of Bristol—Communicated by Sir R. I. Murchison.

A. Gages—Report on Examination of Minerals.

R. Mallet.—Report of Earthquake Experiments.

Professor W. Thomas—An Examination of some Points

in the Doctrine of the Internal heat of the Globe—Communicated by Professor Rogers.

J. Bonwick—On the Extinct Volcanoes of Australia.

The concluding meeting of the Association was held in the Free-Trade Hall at 3 o'clock, W. Fairbairn, Esq., F.R.S., President of the Association, in the chair, when the proceedings of the Central Committee and the grants of money sanctioned by it were announced.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, September 6th*, 1861.]

Dated 4th July, 1861.

1705. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Imp. in the construction and arrangement of apparatus for the manufacture of ice and for the refrigeration of solid and fluid masses in general. (A com.)

Dated 11th July, 1861.

1751. J. R. Cotter, Donoughmore Rectory, Cork—Certain imp. in the pianoforte.

Dated 13th July, 1861.

1761. P. J. De Rette, 9, Rue Guimard, Bruxelles—Imp. in the manufacture of wind musical instruments in brass or other metal to which pistons are applicable.

Dated 23rd July, 1861.

1845. N. E. Dumesnil, 12, Rue aux Loups, Sotteville-les-Rouen, France—Imp. in materials for lubricating parts of machinery and for other lubricating purposes.

Dated 24th July, 1861.

1853. J. Sidebottom, Harewood, near Mottram, Cheshire—Imp. in fire-arms and ordnance.

Dated 26th July, 1861.

1875. F. N. Thurel, 4, South street, Finsbury—Imp. in the method of fastening shoes, stays, gloves, and other wearing apparel

Dated 27th July, 1861.

1879. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in sewing machines. (A com.)

Dated 29th July, 1861.

1887. G. Sturrock, Woolwich—Imp. in the construction of breech-loading fire-arms.

Dated 1st August, 1861.

1909. B. Browne, 52, King William-street—An improved self-acting tap or apparatus for the convenient passage of lighted gas, or other illuminating fluid or liquid, and particularly adapted for lighting cigars. (A com.)

1911. R. Harrison, Port Penrhyn, Carnarvon—Imp. in apparatus for cutting slates and slabs.

Dated 2nd August, 1861.

1919. R. Benton, 5, Great College-street, Westminster—Imp. in machinery or apparatus for obtaining rotary motion by the use of the gravitating power of solid or fluid matter.

Dated 3rd August, 1861.

1933. J. Vavasseur, 28, Gravel-lane, Southwark—A new or improved transportable machine or apparatus for rifling cannon

Dated 6th August, 1861.

1949. G. Potts, Edinburgh—Imp. in the construction of elastic steel mattresses.

Dated 12th August, 1861.

2001. A. Garzend, 29, Boulevart St. Martin, Paris—A new or improved apparatus for cutting up and reducing dye and other wood.

2005. V. Jankowski, Princes-street, Fitzroy-square—Imp. in apparatus for sawing wood and other substances.

Dated 14th August, 1861.

2021. A. A. R. Damoiseau, Paris—Imp. in kilns for baking bricks, tiles, and other similar articles.

Dated 15th August, 1861.

2029. S. Carey and W. M. Pierce, East Ham, Essex—Imp. in apparatus for reburning animal charcoal.

Dated 20th August, 1861.

2065. W. Fitkin, 88, Fleet-street—Imp. in apparatus or instruments for extracting teeth.

2067. R. A. Brooman, 166, Fleet-street—An imp. in preserving meat and other animal substances. (A com.)

2071. J. Somerville, Maidstone—Imp. in apparatus for drilling and tapping gas and water mains and pipes, and in preventing leakage therefrom.

2073. T. Sutton, King's College, London—An improved camera for taking photographic portraits and instantaneous pictures.

2075. F. Gye, Royal Italian Opera, Covent Garden—Imp. in constructing gasometers and gasometer tanks.

2077. G. F. Muntz, Birmingham—Imp. in apparatus for melting metals.

Dated 21st August, 1861.

2081. T. Lambert, Great Henny, Essex—An improved agricultural implement for rolling ridges and furrows or straight work.

2083. W. Clark, 53, Chancery-lane—Imp. in optical and illuminating apparatus. (A com.)

2091. T. Green, Leeds, and R. Mathers, 18, Stoke Newington-green—Imp. in apparatus for transmitting motion to machinery.

2093. W. Richards, Birmingham—Imp. in rifles and projectiles.

Dated 22nd August, 1861.

2103. T. Richardson, Newcastle-upon-Tyne, and R. Irvine, Hurlet, Renfrewshire—Imp. in the manufacture of paper.

Dated 23rd August, 1861.

2109. W. D. Player, Birmingham—Certain imp. in the description of buttons commonly known as linen buttons.

2111. H. Ingle, Shoe-lane, and J. Ingle, Pimlico—Imp. in printing machines.

Dated 24th August, 1861.

2117. J. Cranston, Birmingham—Imp. in the construction of conservatories, orchard houses, and other horticultural erections, which imps. are also applicable to the covering of areas such as are used for drill sheds, markets, railway sheds, colonists and army huts, and many other similar purposes.

Dated 26th August, 1861.

2121. J. Clark, Glasgow—Imp. in the manufacture of envelopes and other covers, and in part applicable to the gumming of sheets of paper.

2123. G. Nye, 18, Mount-street, Lambeth—Imp. in apparatus for administering injection in a continuous stream, also applicable as an eye douche and other purposes.

2129. W. E. Newton, 66, Chancery-lane—Improved machinery for filtering liquids, decolorizing saccharine and other juices, and rectifying alcoholic liquors. (A com.)

Dated 27th August, 1861.

2133. L. M. F. Patureau, Paris—An improved thread-protecting clew box.

2135. J. C. C. Azemar, 40, Mark-lane—The manufacture of an instrument to facilitate the practice of the drum.

2137. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in dampers for stamping purposes. (A com.)

2139. J. M. Hart, 76, Cheapside, and R. Lavender, 2, Acacia-cottages, New-road, Hornsey—Imp. in handles or knobs of locks and latches, and in the means of applying them.

Dated 28th August, 1861.

2143. W. S. Guinness, New York—Imp. in sewing machines.

2145. S. Carpenter, High-street, Banbury, Oxon—Imp. in the construction of carriage wheels.

Patents Sealed.

[*From Gazette, September 6th*, 1861.]

September 5th.

568. Capt. G. B. V. Arbuckle and T. Scott.
569. H. A. Silver and H. Griffin.
590. T. W. Davenport and S. Cole.
591. B. Walker and W. Tilson.
596. J. C. Fisher.
602. J. T. Hutchings.
604. J. Hirst, jun., and J. Hollingworth.
605. J. Tomlinson.
608. A. Aerts.
611. W. Perry.
617. D. Hebson and W. G. Ramsden.
620. G. F. Muntz.
623. J. W. Aston.
630. C. Gammon.
645. C. Stevens.
681. M. Henry.
686. A. Wall.
695. H. A. Bartlett.
720. T. Hindle.
770. F. Chevillard.
832. A. V. Newton.
843. W. E. Newton.
851. B. Knowles.
975. J. Gjers.
1149. J. B. Jarlot.
1219. W. Smith.
1348. F. A. Whitehead.
1429. H. Turner and T. Yates.
1431. H. Turner and T. Yates.
1433. B. D. Godfrey.
1460. J. Mason.
1578. J. Faulding.
1686. J. Terry.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, September 6th*, 1861.]

September 3rd.

2005. R. A. Brooman.

[*From Gazette, September 10th*, 1861.]

September 5th.

2014. J. Fielden.
2081. L. Vidie.

September 6th.

2085. G. C. Grimes.

September 7th.

2043. C. N. Kottula.
2052. J. Knowles.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, September 6th*, 1861.]

September 3rd.

1928. G. M. Miller.

Journal of the Society of Arts.

FRIDAY, SEPTEMBER 20, 1861.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £429,800, have been attached to the Deed.

Medals.

The medals to be awarded will be of one class, for Merit, by International Juries, whose names will be published in March 1862; and it is intended that the awards shall be published in the Exhibition Building, at a public ceremony, early in the month of June, 1862, and these awards will immediately afterwards be conspicuously attached to the counters of the successful exhibitors, and the grounds of each award will be very briefly stated.

Clay Manufactures.

At a meeting held at the Tontine Hotel, Ironbridge, Borough of Wenlock, on the 4th instant, present,—George Pritchard, Esq., High Sheriff of the County; John Pritchard, Esq., M.P.; C. J. Ferriday, Esq., Mayor of the Borough; John Anstice, Esq., J.P.; George Maw, Esq., F.S.A., and all the principal brick and tile manufacturers of the neighbourhood, it was resolved:—

"To organise, for the International Exhibition of 1862, a collective series, illustrative of the clay manufactures of the Coalbrookdale and Broseley coal-field, including the productions of Messrs. Maw, the Coalbrookdale Co., the Madeley-wood Co., Messrs. Burton, Mr. Exley, Messrs. Davis, Mr. Evans, Mr. Lewis, and other manufacturers of the district, in preference to each manufacturer exhibiting separately."

An influential Committee was formed for carrying out the project, and a subscription commenced, towards which nearly £100 was contributed at the meeting, for the purpose of defraying the expenses.

The following arrangements, in addition to those already published, have been made in foreign countries and the colonies:—

Costa Rica.

H.M. Commissioners for the Exhibition of 1862 have received a communication stating that the following gentlemen have been appointed Commissioners to attend to the interests of Exhibitors from the Republic of Costa Rica:—Senores Don Luis O. von Schröter, Dr. Don Alesandro Frantzius, and Dr. Don Emilio Joos.

BRITISH ASSOCIATION, 1861.

The following papers were read before the Mechanical Section:—

On the Application of Workshop Tools to the Construction of Steam Engines and other Machinery. By John Robinson.

In treating the subject of "workshop tools," described otherwise as "machines for making machines," it has been thought well to limit the scope of the observations which will be laid before you to a recent period, during which the great increase in the employment of steam engines and machinery for the purposes as well of locomotion as for almost every branch of manufacture and agriculture, has stimulated the energies of mechanical minds to discover and apply the means, not only of keeping pace with the demands thus made upon them, but also of dealing with the increasingly ponderous masses of metal required in our steam marine and other engines of large size. They have at the same time been obliged carefully to keep in view the accuracy needed in the various details of the higher classes of machinery which we now see produced in our workshops.

Lathes.—The best known and most commonly applied constructive machine is the "lathe," this term embracing as well the amateur's "foot lathe," as the massive machine required for turning our large marine cranks and the centres of our paddle wheels and railway turntables.

Since the invention of the slide motion, these machines have rapidly improved in accuracy of construction, the time being easily recalled when in our machine factories the beds or benches employed for hand-turning lathes (that is, where the steam engine moved the machine, but the hand of the workman fashioned the object revolving in it), were simple beams of timber faced with sheet iron, and supported on cast-iron feet, or on wooden packing blocks. These are now almost universally superseded by cast-iron beds, planed by machine, and adjusted by the file; and in all well-furnished workshops compound slide rests are employed wherever the lathe is geared with sufficient power to permit their use, the self-acting principle being advantageously and simply applied to them by means of an eccentric fixed upon the revolving lathe spindle actuating a chain attached to a ratchet wheel upon the slide rest screw, which receives an impulse at each revolution of the lathe, and the tool is thus made to progress over the surface of the work in hand.

Spherical Rest.—A modification of the ordinary compound slide rest is frequently employed for turning spherical work, both externally and internally, the rest for this purpose having placed upon its upper slide a circular worm table, actuated by a corresponding worm made to revolve at the required speed by the hand of the workman.

Another step in advance of the self-acting slide rest is the "sliding lathe." In this the tool travels, unaided by the workman, not only along the cylindrical surfaces of objects, but also transversely to the work, thus permitting one workman to employ two or more lathes at the same time, and so inducing economy of labour. Another means of increasing the production of work from these machines is that of using several cutting tools in one lathe at the same moment. This is done in the "duplex" arrangement, by which one tool is made to cut upwards in the ordinary way at one side of the object, and a second tool placed opposite to it is taking another cut downwards, the cutting edge of the tool being reversed accordingly.

This operation, whether effected on a slide lathe, or on a compound rest lathe, will be readily understood to be a means of saving time, and thereby of decreasing the cost of the several parts of machines capable of being so operated upon.

It may be interesting to state that this multiplication of the number of cutting tools in one lathe has been carried to the extent of seven, all controlled by one workman, three of them being placed on the side of the bed next to him, and four on the opposite side, all worked by self-acting motions, and thus giving the operator time to watch the action of each. This lathe has been constructed chiefly for the purpose of turning cranked axles for locomotive and other engines, and when so employed, the three tools on the side next the workman are brought to bear longitudinally upon the cylindrical parts of the axle, while the four opposite tools—their cutting edges downwards—are made to act transversely upon each of the two crank sweeps,

the time for effecting the whole operation of turning the axle being thus materially shortened.

A very frequent application of the compound self-acting side rest is, to double face-plate lathes, employed for turning the rims and tyres of locomotive wheels. Many of these "wheel lathes" are constructed with four such slide rests, that is, two to each face plate, one of them holding the downward and the other the upward cutting tool, and placed of course at opposite sides of the objects being turned; the two faces of the rims or of the tyres of the wheels, and two of their sides, being thus operated upon at the same time.

Another form of lathe now in frequent use is the "gap," or "break bed lathe," which permits an object to be turned larger in diameter than that which the actual height of the centres above the ordinary surface of the bed would take in. These "gap lathes" are of two kinds, one being made with a fixed gap always existing, and without the means of closing it by pushing up the bed to the fixed headstock, and the other having the fixed headstock placed on a bolster, bolted to a long planed base plate on which the bed carrying the moveable headstock and slide rest can be shifted at pleasure, so as either to be in contact with the fixed headstock, or at such a distance from it as the object of large diameter may require.

The last class of lathe to which it is intended to refer, is the screw cutting lathe, which is a modification of the sliding lathe, and has the sliding tool carriage put in motion by means of an accurately cut guide screw and nut, the number of revolutions of which, required to give the various pitches of screws, is regulated by the application of "change" and "intermediate" toothed wheels, placed at the end of the fixed headstock, and capable of giving to the tool any required range of motion suited to the pitch of screw to be cut.

Other lathes for special purposes, such as gun boring, propeller turning, lathes with reciprocating motion to face plate, would require a larger space for their description than the limits of this paper would allow; but before leaving the subject of lathes, it may be well to call attention to the fact that the use of these now accurately constructed machines will fail of producing correspondingly accurate results, unless the workman be provided with the means of testing the exactness of his diameters, whether external or internal, the taper of his cones, the correctness of his curves, and the parallelism of his cylindrical objects, which cannot be done without the use of carefully constructed standard guages and templates, many of which are now preserved from a too rapid deterioration, by the hardening process which their surfaces, whether of steel or of iron, are made to undergo.

Planing Machines.—The form of our earlier planing machines, like that of the older lathes, was very simple, although the invention took place at a much later period; but no long time elapsed before self-acting movements were applied to every required change in the direction of the cutting tool over the surfaces to be planed, whether these were horizontal, vertical, or at any angle whatever to the surface of the table. The use of the rack and pinion, and also of the screw and nut, for moving the table, soon succeeded to the original chain motion, the latter especially being employed in those machines where the cutting edge of the tool is reversed at each change of direction of the table, so as to cut during both the backward and forward movements, the speed of the table in both being the same, wherever this system of revolving tool is made use of; whilst in the case of most machines, with tool box arranged for cutting in one direction only, the table is made to return at a speed considerably quicker than during the operation of cutting.

As in the case of lathes so with these machines, the pressure of work to be produced in a given time led to the adoption of several tools cutting at the same moment, and this multiplication of cutting tools has been carried to the extent of employing eight at work simultaneously upon one machine, the power of moving the table being of course increased in the requisite proportion, and in most well-fitted workshops planing machines may be found having two, four, and six tools at work upon them.

Many years ago large planing machines were constructed with the view of operating upon fixed objects of great weight by means of travelling tools; since, in the cases sought to be thus dealt with, the weight of the tool slide and its fittings was considerably less than that of the object to be planed. This arrangement of machine, however, seems not to have obtained to any extent; most of the large masses involved in the ponderous machinery of the present day being planed on ordinary machines of great size, either by traversing them upon the table in the usual way, or by placing them near the side of the machine, and planing them by means of a cutting-tool fixed in a standard and slide-box travelling along with the table, and having a self-acting feed motion imparted to it at each return of the table. This mode of dealing with them is rendered almost imperative by the unwieldy size and form of some of the large castings now employed for constructive purposes.

An interesting adaptation to the ordinary planing machine has been made by the addition to it of a radial arm working upon a pivot, fixed vertically on a bracket extending some distance from the side of the machine, and made to reciprocate with a radiating movement by a pin inserted in the ordinary table, on which is fixed a block capable of adjusting itself in a groove of the radial arm prepared to receive it. By this arrangement objects fixed upon the extended surface of the radial arm receive a curvilinear motion when the table of the machine travels backward and forward, and when the tool fixed on the cross-slide is brought to bear upon the work, the cutting lines form arcs of circles corresponding with the length of their radii measured from the projected centre pivot, which latter being adjustable as to its distance from the vertical plane of the cutting tool, gives great facility for producing a considerable range of curves. This apparatus has been used chiefly for the expansion links or quadrants working the slide valves of locomotive engines, and for objects of analogous form.

It will be well, perhaps, here to refer to an arrangement of machine invented a considerable time ago in this country, and recently reproduced in the United States of America. This machine may be called a circular planing machine, and consists of a circular table made to revolve horizontally upon circular grooves by means of bevil gearing; above this table is fixed, upon vertical standards, an ordinary tool box, moved along the cross-slide by a self-acting screw motion, as in the common rectilineal planing machine. It will be obvious that a piece of metal bolted upon the table could have a true surface produced upon it by the tool applied from the cross-slide above, just as would be the case if it were fixed to the face-plate of a lathe, with a tool traversing in front of it. Machines of this construction seem to be almost obsolete in this country—the lathe and common planing machine being adequate to the production of all usual surfaces.

In consequence of the extensive introduction of hardened surfaces into our higher classes of engine work, it has been found necessary to employ grinding tables, to restore these surfaces to accuracy when irregularities exist after the "dipping" process in wrought-iron and steel, and the "chilling" in the case of cast-iron. Such tables are of two forms,—one like that of an ordinary planing machine, revolving stones or emery rollers being substituted for the steel cutting tools, and made to act upon the surfaces of the hardened objects by lowering the tool slide to them; the other form is a circular disc of copper or lead, in which grooves are cut for the reception of emery powder and oil, and on which, while revolving, the various objects are laid, and the faces brought up to the accuracy required. In both forms facilities have been obtained for the production in our engines of that hardness of rubbing surfaces which our high pressures, and the increasing weight of

the moving parts, are rendering every day more imperative.

Drilling Machines.—In the process of putting together the objects which have undergone the operations of the lathe and planing machine, the drilling machine is called into requisition to produce the holes necessary for the bolts and screws used for fastening together the various parts.

Since the invention of the primitive drilling tool, this class of machine has undergone considerable improvement. For the larger holes, back-geared motions are now applied, resembling in principle those of the lathe headstock, the tools in these large machines being usually brought down to the work by means of worm or other such gearing, whether worked by the hand of the operator or by the machine itself.

A now increasingly frequent form of machine is the "Radial Drill," which consists of a drilling spindle mounted upon an arm, radiating, like the jib of a crane, from a central pivot, the length of the arc described by the drill being variable by a screw, or by a rack and pinion attached to the arm, and the elevation of the machine from the floor being effected by similar apparatus. Some of these machines are attached to independent cast-iron columns or frames, to which the pivoting brackets are fixed, while in others these brackets are simply bolted against the walls of the workshop. These radial machines are found particularly applicable when a great number of holes have to be drilled in large objects, since the drill can be brought to bear on any point embraced within the compass of the arc capable of being described by the cutting tool on the arm of the machine, and thus, not only does it become unnecessary to move the object every time a hole is completed, but the successive holes are produced exactly true with each other, and vertical to the face of the work operated upon.

For special uses drilling machines have been constructed on the planing machine type, having several drilling spindles revolving upon a cross-slide, in an analogous position to that of the cutting tools of a many-tooled planing machine. The objects to be drilled are fixed upon the table in the usual way adopted for planing, and where a number of holes are required to be drilled at regular intervals, it is readily accomplished by a self-acting movement applied to the table, coming into operation immediately one set of holes is completed, and bringing underneath the drills that portion of the object in which the next row of holes is required.

Another form of machine is that called the "slot drill," the intention of these machines being to produce slots or grooves in objects, by means of a drilling instead of a planing or slotting process. In the "slot drill" the article to be operated upon receives a self-acting reciprocation from a stud in a revolving disc, or other similar movement, variable in its extent according to the length of the groove or slot required to be cut, the drilling tool being brought down to the work, at the same time, by one of the ordinary self-feeding processes; by these means a groove of any moderate depth is produced in pins or small shafts, or in any other objects requiring slots or grooves of no great size.

Following upon this machine came the "traversing drill," having a similar end in view, but adapted for larger objects and suited for more accurate work. In this machine the drilling headstock itself is made to reciprocate, by means of a revolving disc movement, along an accurately planed bed, the object to be grooved or slotted being fixed upon a table firmly bolted to the bed, and adjustable by a hand-screw motion; the required length of traverse of the headstock is imparted by a connecting rod actuated by a stud in an indexed groove of the revolving disc, the position of which is regulated by the workman according to the length of slot to be cut, the index marks guiding him readily to the required position. The revolving disc is set in motion by an elliptical spur-wheel cast upon it, and worked by a pinion, keyed eccentrically upon its shaft, so as to accommodate itself to the varying diameters of the pitch line of the elliptical wheel. The object of this arrangement is to obtain a more regular speed in the lateral motion of the tool than would result from an ordinary circular wheel and pinion, which obviously would give a very rapid movement in the middle of the length of the slot, and a very slow one at the two ends. The vertical feed motion is also self-acting and takes place during the slowest portion of the traverse of the headstock, and by this means great regularity and accuracy of effect are obtained, since the drilling tool is not required to cut vertically and laterally at the same time. In many cases, two headstocks and two tables are fitted upon one bed, by which arrangement two ends of a connecting rod, or other similar piece of work can be operated upon simultaneously, and as these drilling headstocks are provided also with self-acting vertical feed movements, which can be used independently of the traverse motion, they can be conveniently employed for ordinary round holes; and when two heads are fixed at any required distance apart upon the bed, it is evident that any number of similar objects can be drilled consecutively by them, and the distance from centre to centre of these holes will always exactly correspond. This machine has been constructed also upon the cross-slide or planing machine type, in which arrangement the objects to be slotted can be placed between the vertical standards or "uprights," and the slot-holes or grooves can be produced either in a line parallel with, or transversely to, the axis of the object in hand, such as an engine beam, a cross head, a piston-rod, or pump-ram of a stationary or marine engine. The use of this class of drilling machine obviates the difficult and expensive process of making cotter and slot-holes, by first drilling through the object a row of cylindrical holes, and afterwards slotting them or chipping and filing them by hand labour; besides which more accurate and highly finished work is obtained from it without any hand adjustment whatever than is ordinarily practicable where manual labour is employed for the purpose.

Slotting Machines.—Next in order to the drilling machine follows the "slotting" or "key grooving machine;" this machine was brought into use many years ago, and has been gradually enlarged in size and capacity to keep pace with the increased dimensions and weight of the masses now required to be operated upon. Its first form was one which the name "key grooving engine" describes, viz., a machine for cutting the grooves in wheel bosses or naves to receive the keys by which they are fixed upon their shafts or axles; subsequently other uses were discovered for this machine, the main feature of which is a tool reciprocating vertically, and convenient motions were added to the table arranged under the tool, the result being an admirable machine having self-acting circular, longitudinal, and transverse motions applied to the tables, by which means the scope of the machine is extended to the production of all forms of outline to which a tool cutting in a vertical direction can be applied; the paring or chiselling operation being now perhaps more frequently employed in this machine than the first one of "key grooving."

A very useful modification of this machine has been constructed in general arrangement like the bed and table of a planing machine, having two pairs of "uprights," or standards with cross beams attached to them; on these are worked "slotting" tools of a moderate length of stroke and capable of receiving a transverse, as well as a longitudinal motion, so that the two tools can be brought to bear upon the vertical surfaces of any large object fixed upon the table, and thus at the same time can be pared or slotted two surfaces whether curved or rectilinear outline. The chief object of this arrangement seems to have been the shaping of the edges of locomotive frames, several of which may be placed one above another on the table, and their edges brought simultaneously to the required form. The two tools of the machine working at the same time

expedite the completion of the work in hand, and thus an economy of time and labour results.

SHAPING MACHINE.—Following upon the "slotting machine," with its vertically working tool, comes the more recently invented "shaping machine," called by our French neighbours the "Limeuse," or "filing machine."

The cutting tool of the "shaping machine" reciprocates horizontally, and in its simplest form is often called the "steam arm." In this the stroke is usually short, say six inches, and no quick return motion is given to it. The surfaces cut by it are flat only, and are traversed along under the tool by a ratchet movement working a screw, having its nut fixed in the table on which the work is placed. The more advanced form of this machine is that in which the work is stationary, bolted on tables fixed to the bed or frame of the machine, and the tool moved along in a travelling head, actuated by a ratchet motion and screw, in a somewhat similar way to that of the table of the "steam arm." This mode of operation gives facilities for cutting larger objects with more extended surfaces, and at the same time permits of curvilinear and cylindrical outlines being produced, the former by a sector and worm motion on the tool box itself, giving the tool a radial action, and the latter by fixing the cylindrically shaped object on a mandril, made to rotate by a self-acting worm and wheel motion attached to the bed of the machine; the tool in this case merely reciprocates in the same line, without having lateral motion applied to it, the rotation of the work itself bringing the successive parts of its surface under the cutting edge.

Various arrangements have been applied to this machine to render the speed of the tool greater on returning from than when making the cut, one consisting of a spur wheel, driving, by means of a stud in its surface, a shaft revolving eccentrically with it. By this apparatus the cutting process is made to occupy about three-fifths of the period of the revolution of the spur wheel to which the movement is attached, the time of the return stroke occupying the remaining two-fifths of the revolution. The distance from the centre of motion is greater during the cutting than in the return stroke, and the power brought to bear upon the tool is proportionately greater during that operation.

Another and very simple method of attaining the same result is the application of a slotted link, radiating from a fixed point, and giving motion to the cutting arm at the other extremity by the intervention of a pin fixed in a revolving disc, and passing through a block sliding in the slotted link. Motion is imparted to this disc by ordinary spur gearing, and the greater the distance from the centre at which the pin is placed, the longer the stroke of the cutting tool, and the greater, at the same time, is the difference between the cutting and returning speed imparted to it.

The length of stroke of tool applied to these machines is continually increasing, and many "shaping machines" are now constructed with two or more cutting heads upon one bed, so as to give greater facilities in fixing the work, and to enable the workman to attend to more than one cutting tool at the same time.

The last form of shaping machine to which it is intended to direct attention, is that used for the purpose of shaping the sides of nuts and the heads of screws or bolts. These machines have been usually made with revolving cutters, the form now employed having two such cutters rotating upon a shaft, their disc faces toothed, and placed at such a distance asunder as to allow the exact finished dimension of the nut or screw head to pass between them; a series of nuts, varying in number according to their size, may be placed on a mandril, fixed by jaws, and a centre point, to the necessary dividing plate, and by a sliding movement of the table they can be passed between these cutters, so as to finish at once to the required dimensions the two opposite sides of the range, all the spring and jar incident to a one-sided cut being avoided by the resistance offered by the operation of the second cutting face. Such machines are readily applied to a variety of other purposes, such as grooving screwing taps, cutting out forked joints, and a large class of similar work, the form, diameter, and speed of the circular revolving cutters being varied to produce the results desired.

WHEEL CUTTING MACHINE.—A machine of a somewhat analogous character is the "wheel cutting machine," constructed for the purpose of cutting the teeth of wooden or iron wheel patterns or models, whether these are of the ordinary "spur" form or for bevil, mitre, or worm wheels. In the older machines the wooden or iron pattern required to be cut is placed upon a horizontal spindle, under, or at one side of which the headstock, with its revolving tool, is fixed upon a slide of sufficient length to travel across the toothed face of the pattern wheel. Some of the more recent machines have been made to cut pattern and other wheels while fixed in a vertical position; and as in much of the spinning machinery now in use wrought-iron toothed wheels are employed, it was needful to construct more simple apparatus for cutting them; amount of production being, in this case, a greater desideratum than great exactness of form and finish. The production of the revolving cutting tools, employed in these machines at a cheaper rate than was possible by hand turning and shaping, has been accomplished by the application of the "pentagraph cutting machine," in which, after undergoing the turning process, the serration, or toothing of the steel cutter discs is effected by small revolving cutters, actuated on the "pentagraph" principle of proportionate adjustable arms starting from the shapes required, and keeping the cutter up to its work with the most minute accuracy; without some such mode of preparing them it is obvious that these cutters would be most costly, and even now, with all modern appliances for their production, the value of each, in proportion to its size, is still considerable.

BOLT AND NUT SCREWING MACHINES.—A machine which has made rapid progress of late years is that used for cutting out the threads of bolts, screws, and nuts. Many forms and arrangements of machine are now in use for this purpose, most of them consisting of a revolving head, somewhat like a lathe head-stock, fitted with a cone-speed pulley, to vary the number of revolutions according to the diameter of the bolt and nut to be cut. The cutting dies are fixed in a box driven by this head, and the bolt is inserted into a sliding frame travelling upon the bed of the machine in front of the die box. In most cases the process of passing through the dies is repeated twice, and even three times for large bolts, before the requisite fullness and quality of thread are obtained. When nuts are to be cut they are usually fixed in the sliding frame, and the tap inserted in the die box of the revolving head is run through them, and the requisite thread at once produced.

Recently a very ingenious bolt and nut cutting machine has been introduced from the United States of America, in which the cutting dies consist of three separate tools arranged concentrically in the die-box, and kept to their work by curved inclines fixed upon the die holding box; the plate forming the front cover of this box has attached to it three curved inclines, corresponding with those of the die box; the die pieces are notched so as to fit upon these latter inclines, and by these notches they are drawn back when each bolt is screwed, and by these means it is at once released.

The internal portion of the box holding the dies is capable of being worked backward and forward by the gearing of the machine itself. This backward and forward movement is produced by the application of two spur wheels of different diameters, keyed upon hollow shafts, one driving the die box when cutting, and the other forcing round the curved inclines in such a way as to effect the withdrawal of the dies. This latter is thrown into gear by a friction clutch box moved by a lever, put into operation by the workman when the requisite length of thread is cut, and when the lever is again released the smaller wheel is thrown out of gear, and the dies resume their

cutting position. The machine then works thus:—The bolt to be cut is fixed into the sliding frame concentrically and accurately by means of "gripping" dies, simultaneously brought together by right and left-handed screws; it is then pressed into the die box by the action of a ratchet lever, and the dies, formed like chasing tools, but with some taper on their cutting faces, completely turn out the thread from the surface, and produce, at one passage of the bolt, a perfectly finished thread, after which, by means of the lever and inclined wedges, the die pieces are at once opened, and the bolt withdrawn instantaneously, without stopping the machine or even reversing its motion; thus great economy of time is gained, and the work produced is of superior quality to that in which the thread is compressed and drawn out by ordinary dies. Nuts are screwed in this machine in the manner already described for the usual construction of machine.

It will be sufficient, for the object of this paper, to mention very briefly the facilities which now exist for the economical production of work in the forging and boiler-making processes, as compared with the condition of things twenty or thirty years ago. The great agent in economising labour in the forge and smith's shop is the steam hammer in its various applications. Originally adopted by engineers, more perhaps for the purpose of working up economically and conveniently the scrap wrought-iron produced in their own establishments, the steam hammer has now become the necessary adjunct of every well-mounted smith's shop, not only working up into useful forgings the scrap iron there to be obtained, but producing pieces of large size, or stamping under conveniently arranged dies all possible shapes of iron work, the "fins" or overplus left on the edges of which are rapidly sheared away by powerful shearing machines, and thus the productions of the steam hammer are, in many instances, passed forward into the planing and turning shops without the intervention of the smith and his assistant hammer men.

Steam-power has likewise been usefully employed in smaller classes of machines for forging bolts, rivets, and other articles of that nature, where large numbers of objects of similar form are required.

Punching and shearing machines also, of enormous power, are now in constant use for punching plates $1\frac{1}{4}$-inch thick, and for shearing bars, plates, &c., up to 4, and even 6 inches, so that all the cutting-off processes are effected either by their means or by the employment of circular saws running at high velocities, and brought to act upon the iron while hot from the hammer, from the rolls, or from the smith's fire.

The operations of the boiler-maker are likewise much facilitated by the employment of steam for the riveting process; several adaptations of steam riveting machines have been applied, all of which have some peculiar points of excellence. The work produced is generally of first-rate quality, tighter in most instances than where hand hammers are employed, and obviously the operations of riveting are much more rapid, especially where suitable steam cranes are used for the convenient manipulation of the large objects to be operated upon.

A riveting machine originally constructed to work by steam has been recently modified to suit the application of hydraulic power, and with results in every way satisfactory.

From this somewhat rapid survey of the chief classes of workshop tools applied to the construction of steam-engines and other machinery, it will be seen that the means now placed within the reach of the mechanical engineer are vastly superior, both in variety and excellence, to those which were at his disposal thirty years ago, when locomotion by steam, both on the land and on the water, first began to make serious demands upon his constructive powers. These demands, accompanied as they were by the application of machinery to all those branches of manufacturing industry which were ready to spring into vigorous existence immediately the necessary transport of material was provided for, stimulated the energies of constructive minds, and the results may be seen on every side when visiting the large establishments of our city.

As an index of the enormous increase in the application of constructive machines in this country since the year 1830, the following figures and facts are placed before you:—

First.—The exportation of steam-engines and other machinery has progressed thus:—

In the five years—			£
From 1831 to 1835 total exports of machinery			845,203
,, 1836 to 1840	,,	,,	2,699,339
,, 1841 to 1845	,,	,,	3,500,565
,, 1846 to 1850	,,	,,	4,940,939
,, 1851 to 1855	,,	,,	8,579,533
,, 1856 to 1860	,,	,,	17,756,136

Second.—During these thirty years the whole of our railway system at home has grown up, with its thousands of locomotives and other accompanying machines.

Third.—In the same period nearly all our existing steam vessels, as well for commercial as for governmental purposes, have been brought into being.

And Fourth.—Our exportation of manufactured cotton, woollen, linen, silk, and other goods, implying a corresponding increase of machinery for their production, has risen from the sum of £38,000,000 in 1831, to the almost incredible amount of £132,000,000 in 1860.

Without the aid, then, of labour-saving tools, no one can suppose that the immense increase in the manufacture of machinery indicated by the foregoing facts could have taken place. Without these tools we must have proceeded at a very much slower speed in every department, and when it is considered that the increase in the number of these machines involves the corresponding increase in the number of workmen employed in their construction, the country may congratulate itself on the existence amongst us of a large class, not only of well-paid, but of very intelligent work-people, the demand for whose labour, as in the case of all manufacturing industry, is rapidly increased, in proportion to the application of machinery to cheapen its productions.

On Street Railways. By J. Haworth.

The object of the following paper is to explain certain improvements in street railways, for which I have obtained letters patent, and which, from the circumstance of their differing from the ordinary modes of laying and working railways, I am disposed to believe not unworthy the attention of the Mechanical Section of the British Association.

I may be permitted, at the outset, to state that my attention was first directed to street railways by the circumstance of the Corporation of the City proposing to grant permission to lay down upon one of our leading thoroughfares a system of rails which I believed to be objectionable, both from the impossibility of the proposed carriages using the road, and from the rails projecting above the surface of the roadway, and thereby not only inconveniencing all light traffic, but rendering the roadway dangerous to horses. On examining the line laid down at Birkenhead, which was the same as that proposed for Manchester, and comparing it with the street railway in Paris, which has the centre of one rail grooved to correspond with a projection on the tyre, I came to the conclusion that the latter was certainly less objectionable than the former, from its being level with the surface; but it appeared to me that the grooving of one line of rails in the French system limited its use, and entailed both inconvenience and delay in changing one set of wheels for another when it was necessary for the vehicle to leave the rails and take the road. It then occurred to me that the objections both to the American and the Paris schemes might be overcome by the introduction of a middle rail, which, being grooved for the reception of a revolving disc at-

tached to the vehicle, would form a guiding rail of itself, and wholly dispense with the necessity of flanged wheels and raised rails.

In the system which I have patented, the outer rails are of 3-inch T-iron, grooved into longitudinal dovetailed sleepers of Dantzic timber, which are $3\frac{1}{2}$ inches at the top, $4\frac{1}{2}$ inches at the bottom, and 6 inches deep. The groove of the sleeper receives a tongue of the rail, which is driven tight in, and screwed down with common screws, firmly uniting the two, and imparting mutual strength and support, as tyres do to wheels, and wheels to tyres. The centre rail is a small-sized Brunel rail, reversed, only $2\frac{1}{2}$ inches wide. The groove on its surface is $\frac{9}{16}$ths of an inch in width at the top, $\frac{3}{8}$ths at the bottom, and one inch deep. The rails being laid perfectly level with the roadway, present no obstruction to the ordinary traffic. The perambulating wheel, which works in the grooved rail, is 11 inches in diameter, and is centred in a bar hinged to the fore-axle of an ordinary omnibus, and duly spurred, so that, as the wheel revolves, the axle is always at right angles to the rails. The apparatus is supported above the road by a chain attached to a lever fixed to the footboard, which the driver, at pleasure, can raise or lower, and then, with the greatest ease, either take or leave the rails. The facility of running off the rails renders it unnecessary, except in the case of very extensive traffic, to have a double line, as, by arrangement, the descending omnibus can give place to the ascending, and the use of sidings are dispensed with.

The main advantages which this arrangement presents are:—

1st. Cheapness of construction. Neither cross sleepers, chairs, nor tye-rods are required, nor, in fact, any other of the present railway appliances.

The metals can be supplied, drilled and countersunk, at £8 per ton. The three rails combined weigh 64lb per yard, and one ton will lay 35 yards, or $50\frac{1}{4}$ tons one mile. The sleepers, creosoted by Bethel's patent, cost 6d. per lineal foot, and can be put down by joiners and labourers at a small expense. The total cost, therefore, per mile of rails complete, will not exceed £1,000. Perambulators, suited for any four-wheeled vehicle, can be supplied for the sum of £5 each.

2ndly. This system presents no impediment whatever to ordinary traffic, the rails being level with the road, and therefore crossed without offering any obstruction.

3rdly. No special vehicles are required to be constructed for this system, for the central wheel with its apparatus can be attached to all existing omnibuses and conveyances at a trifling expense.

4thly. It is calculated that a saving of 35 per cent. will be effected in haulage power, and of 75 per cent. in wear and tear of rolling stock, by this system.

5thly. The increased ease and comfort in travelling need scarcely be pointed out; the practicability of conversing with your neighbour in an omnibus is not the least of the advantages of a noiseless system, and a smooth road occasions less fatigue to the passengers.

The application of such a system of street railways upon the centre to the suburbs of large towns, cannot fail to afford great convenience to the public, and to be a lucrative undertaking to proprietors. The existing railway scarcely met the requirements of communities rapidly extending themselves over the outlying districts of our principal cities, and the advantages of being securely and comfortably put down at one's own door, or in one's own street, need scarcely be pointed out. Upon such a street railway two horses would be able to convey 40 passengers in an omnibus weighing 30 cwt., and costing £150, whilst the ordinary first-class railway carriages required to carry 40 passengers weigh 9 tons, and cost about £700. In fact, for such short distances as those referred to, street railways may be considered in point of economy a step in advance, as marked as the introduction of railways was in speed over the old system of coaching.

If the trustees of turnpike roads in populous districts were, at their own expense, to put down rails for omnibus use, the expenditure would soon be recovered by the economy which would result from the traffic being transferred from the road to the rails, and coach proprietors, in addition to the ordinary tolls, would doubtless consent to pay mileage, in return for the saving effected in horses and rolling stock, and with the reasonable expectation of a continuous increase in the number of passengers.

In conclusion, I have to express my conviction, derived from lengthened practical knowledge of road maintenance, that some system of street railways, whether that which I have attempted to explain, or any other system, must ere long become an institution amongst us to keep pace with the growing traffic of our large cities, and to meet the requirements of an increasing commerce.

The model before you is constructed upon a scale of $\frac{1}{2}$-inch to the foot, and is designed to put the perambulating theory to the severest practical test. The curves are quick and the junction of the rails is at an acute angle; yet it will be found that the wheels of the vehicle retain their position upon the rails, and that the centre wheel traverses the groove with regularity and certainty. I have prepared models of omnibus, cab, and lurry, in order to show the applicability of my system to various classes of vehicles.

EXAMINATION PAPERS, 1861.

(*Continued from page* 647.)

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in April and May last:—

GEOGRAPHY.

THREE HOURS ALLOWED.

The candidate is not allowed to answer more than *twelve* of the following questions. It is imperatively required that *either No.* 1 *or* 2 (or both, if preferred by the candidate) shall be amongst the twelve selected for answers.

1. Draw a rough Map of any one of the counties of Great Britain or Ireland—showing its general shape, the relative places of its high and low grounds, and the courses of its principal rivers. (If the county selected include a coal-field, or other important mineral deposit, mark the locality.)

2. Draw a rough Map—showing the high and low grounds, rivers, lakes, and sites of principal towns—of any one of the following countries:

(*a*) Italy.
(*b*) Switzerland.
(*c*) Russia in Europe.

3. Name the principal rivers in Great Britain and Ireland, in order of geographical succession, with the seas into which they fall.

4. Specify the positions of the following places:—Bourdeaux, Trieste, Stettin, Odessa, Helsingfors, Bahia, Valparaiso, Charleston, Batavia, Rangoon, Muscat, and Kurrachee.

5. Write a short account of the Ionian Islands—giving the names of the principal islands, with some particulars respecting their climate, commercial produce, and inhabitants.

6. Enumerate the states hitherto comprehended under the title of the United States, classifying them as they lie—(1.) On the Atlantic sea-board; (2.) Within the Mississippi valley; or, (3.) To the west of the Rocky Mountains. Distinguish by a mark (*) those of them that are slave states.

7. From what other countries, besides the United States, has the supply of raw cotton to Britain been hitherto derived? Name, in addition, any regions elsewhere, of which the climate, soil, and other conditions,

are such as to warrant the expectation of a future supply of that material.

8. Name the Australian colonies of Britain, specifying, in the case of each, the chief characteristics of climate and produce, and the names of its principal towns.

9. Among localities of historic note in Britain, are Bannockburn, Culloden, Towton, St. Alban's, Runnymead, Naseby, Flodden, Dunbar, Colchester, Bosworth, Killiecrankie, and Kenilworth: name the county in which each is situated.

10. Make a list of the principal mountain-chains in each division of the globe (Europe, Asia, &c.), stating, in the case of each, whether its general direction is north and south, or east and west.

11. What are the Monsoons? Where do they prevail, and how is their prime characteristic to be accounted for?

12. Write a brief description of *any one* of the following rivers—stating its course, general character of basin, chief tributaries, capability of navigation, and any other particular of importance:—

(*a*) St. Lawrence.
(*b*) Yang-tsze-kiang.
(*c*) Nile.

13. State briefly the chief causes to which differences of climate are due. Give some instances of particular countries or districts in illustration.

14. The indigenous productions (vegetable and animal) of the New World differ strikingly from those of the eastern half of the globe. Give some examples of this—in the case, more especially, of the food-plants, and of the domesticated quadrupeds.

15. What towns in the British Islands are distinguished as seats of the following manufactures:—cotton, linen, woollen and worsted, silk, cutlery, hardware in general, and earthenware?

16. Name, in geographical succession, the countries that lie round the Mediterranean Sea; and also the principal commercial ports that are upon its shores, with the particular locality of each.

ENGLISH HISTORY.

THREE HOURS ALLOWED.

1. Give a short life of Alfred, and mention the principal institutions that have been rightly or wrongly ascribed to him.

2. Explain the feudal system.

3. Give a short history of the dispute between Henry II. and Thomas à Becket.

4. Trace the growth of Parliament and its privileges down to the reign of James I.

5. Give, with dates, a short outline of the history of Queen Elizabeth.

6. Give a short history of the causes that led to the war between Charles I. and his Parliament.

7. What parliaments sat between 1638 and the Restoration, and what were their principal measures?

8. Give, with dates, a short life of Oliver Cromwell.

9. Give a short abstract of the Bill of Rights.

10. Explain the South Sea scheme.

11. Who were Prime Ministers under George III? Give the names in chronological order, and mention any remarkable events that occurred during their periods of office.

12. Between whom, and in what reigns, were the battles of Hastings, Lewes, Towton, Pinkie, Naseby, Blenheim, and Vittoria fought? Describe one of them.

13. What was the relationship of Queen Elizabeth to James VI. of Scotland, and what claim had James to the throne of England during Elizabeth's life-time?

14. Enumerate the principal British possessions.

ENGLISH LITERATURE.

THREE HOURS ALLOWED FOR THE TWO AUTHORS SELECTED BY THE CANDIDATE.

Shakspeare.

Othello; Richard III.; As You Like It.

1. To what person does each of the following passages belong, and in what connection is it introduced? Explain the allusions, and anything which may be remarkable in the words or grammatical construction:—

(a) And this our life, exempt from public haunt,
Finds tongues in trees, books in the running brooks,
Sermons in stones, and good in everything.

(b) Hold your hands!
Both you of my inclining and the rest:
Were it my cue to fight, I should have known it
Without a prompter.

(c) Conscience is but a word that cowards use,
Devised at first to keep the strong in awe.

(d) And then he drew a dial from his poke,
And looking on it with lack-lustre eye
Says very wisely, "It is ten o'clock:
Thus may we see," quoth he, "how the world wags."

(e) But, God be thanked, there is no need of me;
And much I need to help you, were there need:
The royal tree hath left us royal fruit,
Which, mellowed by the stealing hours of time,
Will well become the seat of majesty,
And make, no doubt, us happy by his reign.

(f) Not poppy, nor mandragora,
Nor all the drowsy syrups of the world,
Shall ever medicine thee to that sweet sleep,
Which thou owedst yesterday.

2. Give the sense of the following passages in simple prose. From whence are they taken?

(a) Now are our brows bound with victorious wreaths,
Our bruised arms hung up for monuments,
Our stern alarums changed to merry meetings,
Our dreadful marches to delightful measures.
Grim visaged war hath smoothed his wrinkled front
And now, instead of mounting barbed steeds
To fight the souls of fearful adversaries,
He capers nimbly in a lady's chamber,
To the lascivious pleasing of a lute.

(b) Good name in man or woman, dear my lord,
Is the immediate jewel of their souls.
Who steals my purse, steals trash; 'tis something, nothing—
'Twas mine, 'tis his, and has been slave to thousands;
But he that filches from me my good name,
Robs me of that which not enriches him,
And makes me poor indeed.

Section II.

1. To what political prejudice has Shakspeare been charged with yielding in Richard III.? On what particulars in the play is the charge founded?

2. Compare the character of Richard III., as drawn by Shakspeare, with that of Iago.

3. From what sources does the foundation of the plots of Othello, and As you Like it, appear to have been derived?

4. Give a brief sketch of the plot of the first two acts of Othello?

5. What are the probable dates of the composition of the three plays? What do you know of the existing authorities for the text of each?

Bacon.

(Essays.)

I.

1. How does Bacon define the following terms:—"Cunning," "goodness," "goodness of nature," "simulation?"

2. Explain the following passage:—

(a) Superstition hath been the confusion of many states, and bringeth in a new *primum mobile* that ravisheth all the spheres of government.

(b) Plato had an imagination that all knowledge was but remembrance; so Solomon giveth his sentence, that all novelty is but oblivion. Whereby you may see that the river of Lethe runneth as well above ground as below.

3. Explain Bacon's use of the following words:—"Shrewd," "mere," "politics," "arietation," "queching," "favour," "adust," "push," "lurch," "newel," "obnoxious," "commodity," "foil."

4. Explain the following passages:—

(a) Dangers are no more light if they once seem light; and more dangers have deceived men than forced them.

(b) Virtue was never so beholden to human nature, as it received its due at the second hand.

(c) Superstition is now so well advanced that men of the first blood are as firm as butchers by occupation; and votary resolution is made equipollent to custom even in matter of blood.

II.

1. Give a brief analysis of the essay of Atheism.

2. Give some account of the following persons mentioned in Bacon's Essays:—Busbechius, Apollonius of Tyana, Celsus, Tamerlane.

3. Macaulay says:—"It rarely happens that the fancy and the judgment grow together. It happens still more rarely that the judgment grows faster than the fancy. This seems, however, to have been the case with Bacon." Illustrate this position from the Essays.

4. Compare the style of Bacon's Essays with that of any other essayist with whom you may be acquainted.

5. How is the morality of Bacon's Essays illustrated by his life?

Milton.

(Paradise Lost. Books I. to IV.)

1. Explain the connexion of each of the following passages, and notice any remarkable uses of words or peculiar grammatical constructions which may occur in them.

(a) What though the field be lost?
All is not lost; the unconquerable will
And study of revenge, immortal hate,
And courage never to submit or yield,
And what is else not to be overcome;
That glory never shall his wrath or might
Extort from me.

(b) For what can force or guile
With him, or who deceive his mind, whose eye
Views all things at one view?

(c) Which when Beelzebub perceived than whom,
Satan except, none higher sat, with grave
Aspect he rose, and in his rising seemed
A pillar of state.

(d) The louring element
Scowls o'er the darkened landskip snow, or shower.

(e) Him round
A globe of fiery seraphim inclosed,
With bright emblazonry and horrent arms.

2. Explain the allusions in these passages, and state their context:—

(a) As when by night the glass
Of Galileo, less assured, observes
Imagined lands and regions in the moon:
Or pilot, from amidst the Cyclades
Delos or Lamos first appearing, kens
A cloudy spot.

(b) As at the Olympian games, or Pythian fields;
Part curb their fiery steeds, or shun the goal
With rapid wheels, or fronted brigads form.

(c) And like a comet burned,
That fires the length of Ophinchus huge
In the arctic sky, and from his horrid hair
Shakes pestilence and war.

(d) Confounded Chaos roared
And felt tenfold confusion in their fall
Through his wild anarchy.

(e) Anon they move
In perfect phalanx to the Dorian mood
Of flutes and soft recorders.

3. Express the sense of the following in plain prose:—

His form had not yet lost
All her original brightness, nor appeared
Less than Archangel ruined, and the excess
Of glory obscured: as when the sun new-risen
Looks through the horizontal misty air,
Shorn of his beams; or from behind the moon,
In dim eclipse, disastrous twilight sheds
On half the nations, and with fear of change
Perplexes monarchs: darkened so, yet shone
Above them all the Archangel,

4. Explain these words and phrases:—

adamant	Sabæan odours
empyrean	sovran
arreed	fourfold-visaged Four
amerced	hosting
anarch	this less volubil earth

Section II.

1. Briefly state the argument of the Fifth Book of Paradise Lost.

2. Give some account of the circumstances under which Paradise Lost was written.

3. What objections have been made to Paradise Lost, on the ground that its subject is not fit for an epic poem? What is your own opinion on the subject?

4. What are the principal allusions to the poet himself in the poem.

5. Which are the most important prose works of Milton?

Craik.

(Outlines of the History of the English Language.)

1. Who were the Angles, Saxons, Jutes, and Frisians?

2. Give a list of Latin words admitted into the English language before the Conquest.

3. Show by a table the various branches of the Indo-European family of languages.

4. When did the following writers live:—Robert of Gloucester, Robert of Brunne, Holcott, Higden, Layamon, and the author of the Ormulum? Give some account of their writings.

5. What is meant by "Middle English," "Latin of the Third Period," "Early English."

6. What two tendencies mark the language of Chaucer and his contemporaries?

7. What traces are there of a Scandinavian element in the English language, and in our topographical nomenclature?

8. Sketch the history of the English language between A.D. 1000 and A.D. 1400.

9. What peculiarities distinguish the language of the Ormulum from the Original English.

10. Write the following passage in modern English:—
Here fon heo durre the lasse doute, but hit be thorw gyle
Of fol of the selve lond, as me hath y seye wyle.
Explain as far as you can its grammatical construction.

TRENCH.

(English, Past and Present.)

1. Give some accounts of the different elements out of which the English language has been formed, and state the proportion in which each of them is said to exist.

2. State what is meant by "a living language."

3. Give some examples of the gradual way in which foreign words generally obtain a footing in our language.

4. The language of Chaucer is said to have been less intelligible to Dryden and his contemporaries than it is to us. Explain this statement.

5. Give some instances of good words being dropped in our language, and worse ones taking their place.

6. What is the difference between strong and weak præterites? Exemplify the tendency in modern times to drop the former.

7. Show how some words have contracted, and how others have expanded their meaning.

8. State the word which is derived from the same source as each of the following, and explain the difference of meaning:—tradition—hospital—secure—persecute—faction—fealty—ransom—parcel.

(9.) Explain and give the origin of each of these words:—

chimerical	tantalise	pasquinade
hermetic	academy	sycophant
spinster	lazaretto	Tartar
dunce	simony	gossip

(10.) What changes of meaning have the following words undergone:—religion—his—knave—villain—worship—miscreant?

CHAUCER.

SECTION I.

The busy larke, messager of daye,
Salueth in hire song the morwe gray;
And fyry Phebus riseth up so bright,
That all the orient laugheth of the light,
And with his stremes dryeth in the greves
The silver dropes, honging on the leeves.

The destine, mynistre general,
That executeth in the world over al
The purveans, that God hath seye byforn,
So strong it is, that they the world had sworn
The contrary of a thing by ye or nay,
Yet some tyme it schal falle upon a day
That falleth nought eft in a thousend yeere.
For certeynly oure appetites heere,
Be it of ware, of pees, other hate, or love,
Al is it reuled by the sight above.

Wost thou nat wel the olde clerkes sawe
That who schal geve a lover eny lawe,
Love is a grettere lawe, by my pan,
Then may be geve to eny erthly man?
Therefore posityf lawe, and such decre,
Is broke alway for love in ech degree.

(a) Turn each of the above passages into modern English.

(b) Explain the obsolete words and constructions.

(c) Which words does the versification require to be pronounced in a manner contrary to modern usage?

2. Give the meaning of the following words and phrases:—

asegid	waymentynge	seistow
to ere	crydestow	noot
	to werreye.	
	atte unset stevene.	
	to rouke.	

3. In what senses does Chaucer use these words:—

every	morwe	sotel	offendid
thankes	or	purveans	queynt

SECTION II.

1. Sketch the story of Palamon and Arcite.

2. From what sources does Chaucer appear to have taken the foundation of the story?

3. Give the character of the Knight from the particulars stated in the prologue.

4. What do we know of the early life of Chaucer? Give a list of his principal works.

POPE.

(Essay on Criticism; Essay on Man; and Rape of the Lock.)

I.

1. To what does Pope allude in the following lines:

Still green with bays each ancient altar stands,
Above the reach of *sacrilegious* hands;
Secure from *flames*, from *envy's* fiercer rage,
Destructive *war* and all-involving age.

2. Explain the allusion in the following passages:—

(a) The fiery soul abhorred in Catiline,
In Decius charms, in Curtius is divine.

(b) Shall burning Ætna, if a sage requires,
Forget to thunder, and recall her fires?

(c) And more true joy Marcellus exiled feels,
Than Cæsar with a senate at his heels.

3. Explain the following:—

Force first made conquest, and that conquest law;
Till superstition taught the tyrant awe,
Then shared the tyranny, then lent it aid,
And gods of conquerors, slaves of subjects made.

4. Explain the allusions in the following passages:—

(a) So Rome's great founder to the heavens withdrew,
To Proculus alone confessed in view.

(b) Fear the just gods, and think of Scylla's fate.

(c) A pipkin there, like Homer's tripod walks.

II.

1. Give a brief analysis of Part II. of the Essay on Criticism.

2. Pope says that in poetry "the sound must seem an echo to the sense." Illustrate this precept from his poems.

3. State clearly the design of the Essay on Man.

4. What, according to Pope, are the functions of self-love and reason?

5. Johnson says:—"The scale of existence from infinity to nothing cannot possibly have being." State Pope's views on this point.

6. Give a brief sketch of the "machinery" of the Rape of the Lock.

(To be continued.)

DISINFECTION OF SEWAGE.

A very important experiment has lately been brought to a successful result at St. Thomas's, Exeter. Last year the Board of Health of that district were indicted for nuisance arising from their sewage outfall, annoying the servants and passengers of an adjoining railway, and were about to expend £1,200 to convey the sewage to a more distant point and discharge it into the River Exe. When just about to incur this heavy expense for so very unsatis-

factory an object, the attention of the Board was called to the successful use of carbolic acid by Mr. McDougal, in disinfecting the sewage of Carlisle, and after long discussions they determined upon adopting the same plan. The result is most satisfactory; £1,200 has not been expended, but instead of it only 10½d. a day is spent for carbolic acid, the sewage is rendered inoffensive, and may be, and probably will be, employed usefully without annoying anyone, and pollution of the river is avoided.

Home Correspondence.

THE EXHIBITION OF 1862 AND RAILWAY COMMUNICATION.

SIR,—In reading the very elaborate article in the *Journal of the Society of Arts* of the 13th inst., by Mr. Robert Bowley, in which such overwhelming masses of railway passengers are recommended to be brought to one focus, and then, by a new line of railway, direct to the Exhibition building, the late disastrous railway accidents are constantly obtruding themselves upon the mind.

The whole system of what is now called, or rather miscalled, railway inspection, appears imperatively to call for an entire revision. I leave, for the present, the important question, whether a military engineer, without any previous knowledge of the construction or of the working of railways, is likely to make a more efficient railway inspector than a civil engineer who, in the practice of his profession, becomes well acquainted with the construction and working of railways. What appears more particularly to call for a speedy remedy is the system of railway inspection. At present the inspector is only "in at the death." He is simply an "accessory after the fact," but appears powerless to prevent an accident. When a fearful calamity takes place, the cause or causes of which can seldom be satisfactorily made out, the railway inspector makes his appearance and questions the witnesses, which, probably, is more than he has a right to do by the limited authority which the legislature has thought proper to confide to railway inspectors. The inspectors of mines are each appointed to a district, and have authority to visit the whole of the works in their district, and to ascertain by personal inspection what precautions are adopted in each locality for the prevention of accidents. The most efficient of these precautions, which are successfully applied in one case, is suggested for adoption at works of a similar nature in the district under inspection. In this way there is really as efficient an inspection as is consistent with the entire responsibility of the owners and managers of the several works, and this is all that ever ought to be attempted.

If this mode of inspection be successful as respects mines, where there exists considerable diversity in the nature of the workings and of the gases evolved, how much more efficient might it not be if applied to railways, where it is possible to introduce a perfectly uniform system when found efficient?

Let a railway inspector have a district of such an extent that, by devoting his entire time to it, he may become thoroughly acquainted with the works and with the mode of working the traffic. He would soon be enabled to ascertain the most efficient and the safest mode of working, and would suggest the introduction of the most efficient modes of operation to the several companies under his inspection, and by the whole of the inspectors acting together and combining their experience, something like a really efficient uniform railway inspection would be the result. Asking a few unimportant questions at an inquest is a complete burlesque upon railway inspection. A periodical and efficient inspection of the whole of the works of a railway, particularly permanent way and tunnels, would very much conduce to the safety of railway travelling. Railway tunnels have all been hastily constructed, and in some cases of inferior materials; and the nature of the work almost precludes the possibility of a very minute inspection during the progress of construction; add to this the sub, or rather the sub-sub-contract system introduced in railway construction, and it will be apparent that works executed under such circumstances should be carefully watched. There can be no doubt but that railway directors would give every facility in their power to a more efficient railway inspection.

I am, &c., NEMO.

RAILWAY COLLISIONS.

SIR,—The late dreadful railway slaughters have set all who are exposed to like dangers thinking how they may best be diminished. As I have to spend much of my time on railways, whatever can make them safer is to me a matter of personal as well as of general interest.

Much has been done to diminish the chance of collision, but not all that is needed, as recent examples show. Years ago it was proposed that clocks should be used with two fingers, one to be moved by the clockwork, the other to be set to the time at which the last train passed, by a lever to be moved by the train as it passed. Of course, the distance between the two fingers would show the interval of time elapsed since the fixed finger was set, and the driver of the next train would know pretty nearly how much the preceding train was ahead. The objections to this plan are obviously, first, the cost of procuring as many clocks as would be needed; secondly, the trouble and expense of keeping them all wound up and in order. The advantages might, however, be secured by very simple and cheap means. It would be very easy and inexpensive to erect at short intervals along the line danger signals, to be raised by a lever acted upon by each passing train, and allowed to descend slowly and gradually, the descent being regulated by a fly or other simple regulator. Such a danger signal, if quite up, would inform a driver that the train had just passed, and that he must stop instanter. If partly up, he would know whether 1, 2, 3, or more minutes had elapsed, and would cut off steam more or less accordingly. If the signal was quite down, he would know that no train had passed, at the least, during the time necessary for the signal to descend, and he might proceed with confidence.

If such signals were used at sufficiently short intervals, there would be little risk of one train overtaking another unawares.

If railway companies would compel their managers, station masters, and all other servants concerned in any accident, to pay a part of the loss occasioned by them. accidents would be less frequent. Of course, if those employed had to bear this extra risk, they would require larger remuneration, which would be a cause of profit to the careful but of loss to the careless. The extra remuneration would be money well laid out. It is stated in to-day's *Times*, that last year the railway companies paid in compensation for accidents and losses £181,170. Much of that large sum might have been saved were part of the risk thrown upon the managers, &c., and they paid to incur that risk, getting profit in proportion to their success in avoiding it. The real loss from accidents is far greater than the compensation paid, for carriages and engines are broken, and to some extent travelling discouraged. To increase risk by saving, is extravagant economy.

I am, &c.,
P. H. HOLLAND.

36, Cavendish-square.

Proceedings of Institutions.

THE FAVERSHAM INSTITUTE.—The seventh annual meeting was held on Tuesday, Sept. 10th. The report represented that the Institute had enjoyed a year of great prosperity. The number of members had been raised to 682, giving an increase during the year of 195. The

income had been £190 14s. 6d., and the expenditure £187 9s. 6¼d. The library had received no less than £53 1s. 5d., with which had been purchased upwards of 200 volumes. Lectures had been delivered by Messrs. Blake, Vincent, Wheeler, Massey, Parsons, Drs. Letheby, and Lankester, Mrs. Balfour, and Rev. Paxton Hood. The entire cost of the course had been more than covered by the sale of lecture tickets and payments at the door. The *soirée* had been well attended, and a profit had been realised thereby. Prizes had been offered to induce members to compete in the writing of an essay and in the construction of a map of England and Wales. The successful competitors received their rewards at the last annual *soirée*, at the hands of the Mayor of Faversham. A singing class had been established and had become a very important auxiliary. A great effort had been made to obtain a suitable building for the purposes of the Institute, and the funds raised for that object had enabled the committee to purchase a most eligible site, and to obtain very excellent plans, a considerable portion of which would, in all probability, be carried out by the end of May, 1862. An attractive course of lectures would be delivered during the approaching winter season. The members of this Institute have access to a library and can attend a course of lectures on payment of three shillings per annum.

GLASGOW MECHANICS' INSTITUTION.—The new building erected by the directors of the Mechanics' Institution having recently been finished, it was formally opened on the 30th of August by a conversazione, at which there were between 400 and 500 persons present. In the new building there are four floors above the level of the street, and under these a basement floor, containing the house of the janitor and other suitable accommodation. In these four floors there are a library and lecture hall capable of accommodating four hundred students—ten well-lighted class rooms of great capacity and convenient access. The front is divided into five bays, in the centre of which, on the ground floor, is the doorway, covered by a Doric portico projecting several feet from the front wall. The entablature of the portico is carried along the whole front, dividing the façade into two orders. A colonnade of six attached Ionic columns forms the upper order, and embraces two floors in its height. The entablature of this order, with an imperforated parapet, alone complete the elevation. Bailie Couper, President of the Institution, took the chair, in the large lecture hall, and on and around the platform were—Mr. Sheriff Barclay, Perth, Bailie Govan, Deacon-Convener M'Lellan, Councillors Binnie, Martin, James Taylor, M'Culloch; Rev. Dr. Jamieson; Messrs. Wm. M'Adam, A. K. Murray, David Moore, James Inglis, Wm. Haddow, Robert M'Intyre, John M'Dougall, Wm. M'Lellan, Mossman, &c., &c. The meeting having been opened with prayer by the Rev. Dr. Jamieson, Bailie Couper said—Ladies and gentlemen, it is very gratifying for me to see so many friends assembled upon this particular occasion to inaugurate this beautiful and interesting edifice. This is a period in the history of the Institution that calls for renewed zeal and energy from all its friends. I have now had the honour of being its president for four years, and can bear testimony to its progress and proficiency, and the high position it now occupies; thanks to the untiring care and watchfulness of the directors, the energy and ability of the lecturers and teachers. The students also that have attended the classes hitherto deserve the highest commendation. The accommodation in the lecture halls and large class rooms is larger and much better than was had in the old buildings in Hanover-street. The new arrangements already made, and the others that are now in progress, will, when completed, largely benefit the industrial classes to a degree never before attained. We expect and earnestly desire the support and assistance of the people generally; nay more, we look forward to a coming day when the working classes of Glasgow will freely and cheerfully cast in their mite for the sustenance of their own Institution, which has been erected, and is managed solely and excusively for their own particular benefit. Thousands of young men have been educated in the Glasgow Mechanics' Institution, and not a few of them can date their success and prosperity in the world to the valuable instruction they there received. But while some would gladly admit this fact, still they cannot understand why it is that an institution of such a benevolent kind should have an edifice of such a costly description. We reply, that when we looked at the great city of Glasgow itself, which fills so much space in the eyes of the world, and when we thought of her public spirit and public Institutions, and we considered the all-important fact that Glasgow was the first city wherein was established a Mechanics' Institute, we the directors, felt warranted to add a public building that would not only be useful, but also of such an architectural character as would be thoroughly in keeping with the times in which we live, and which also would command the entire approbation of our fellow-townsmen. Every effort will be made to extend the library and the museum. The drawing department will be furnished with every requisite to give additional advantage to the students. No pains will be spared in giving every facility of conveying useful and solid instruction, for the purpose of improving and fixing upon the minds of young men principles that will ultimately tend to their own personal good, and to the good and well-being of society wherever Providence may direct. I am delighted to observe that there are present amongst us many gentlemen who took an active part in establishing the Glasgow Mechanics' Institution, now nearly forty years ago; and it gives me an additional pleasure to name Sheriff Barclay as one of the most earnest and active members of that period.—Sheriff Barclay then gave some of the early history of the Institution, and Bailie Govan, Mr. Cunliffe, and Mr. More afterwards briefly addressed the meeting, and the proceedings were brought to a close by a vote of thanks to Sheriff Barclay.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, September 13th*, 1861.]

Dated 25th June, 1861.

1623. F. Warren, Birmingham—Imp. in the machine used for cleaning cotton, and commonly called "Churka or roller gin."

Dated 29th June, 1861.

1665. W. Clark, 53, Chancery-lane—Imp. in excavating machinery. (A com.)

Dated 6th July, 1861.

1722. W. Pask, Sydney, Gloucestershire—Procuring a colouring matter from the refuse of iron stone, called "Colour spert."

Dated 15th July, 1861.

1776. T. Cobley, Meerholz, Germany—An improved process for the production or manufacture of fluo-silicates of tin, zinc, and baryta, and their application as pigments for glazing, enamelling, and in the manufacture of glass.

Dated 16th July, 1861.

1790. J. P. Gillard, Paris—Imp. in the manufacture of soda, carbonate of soda, and hydrochloric acid, and in apparatus connected therewith.

Dated 22nd July, 1861.

1836. C. N. Kottula, Holborn—Certain new compositions to be used in the manufacture of soap.

1840. W. E. Newton, 66, Chancery-lane—Imp. in engines for obtaining motive power by an explosive mixture of inflammable gases and air. (A com.)

Dated 23rd July, 1861.

1846. R. Thompson, Charlton, Kent—Imp. in machinery for cutting wood.

Dated 27th July, 1861.

1885. J. Robertson, 53, Park-street, Mile End—Imp. in apparatus for the treatment of bodily pain with hot water, steam, hot air, and the like.

Dated 1st August, 1861.

1910. H. Mearing, 18, Great Randolph-street, Camden-town—An improved lucifer match and prepared paper for igniting the same.

Dated 7th August, 1861.

1967. L. W. Viollier, Lyons—Imp. in machinery for doubling and twisting yarns and threads, and for manufacturing wire rope. (A com.)

Dated 8th August, 1861.

1974. R. De Clercq and E. Chazelles, Brussels—Imp. in machinery or apparatus for raising water and other fluids.

Dated 12th August, 1861.

2004. A. Salomons, Old Change—A bodice skirt, a new or improved article of female apparel. (A com.)

Dated 14th August, 1861.

2026. W. Wilds, Hertford—Imp. in apparatus for ventilating.

Dated 15th August, 1861.

2032. J. C. Martin, Barnes, Surrey—An imp. in treating bones, and in the manufacture of the products thereof.

Dated 17th August, 1861.

2050. Z. Colburn, 15, Tavistock-street, Bedford-square—Imp. in apparatus for heating water intended for the supply of steam boilers.

Dated 19th August, 1861.

2053. W. Bennett, 14A, London-street, Paddington—A new and improved composition to be used as fuel and in the lighting of fires.

Dated 20th August, 1861.

2074. R. S. Lambert, White-hall, Clevedon, Somersetshire—An improved "skipping dipper" or vessel for removing sugar and other liquids from boiling pans.

2078. N. Fisher, Milton, near Blisworth, Northamptonshire—Imp. in agricultural implements for grubbing and cultivating land.

Dated 23rd August, 1861.

2104. J. Whitworth and W. W. Hulse, Manchester—Imp. in sights for small arms and ordnance, and in fitting apparatus used with small arms.

2106. J. Dunn, Alnwick, Northumberland—An imp. or imps. in reaping machines.

2108. S. Elson, Oldham—Imp. in apparatus for heating the feed water of steam boilers, superheating steam and furnace condensation.

2110. R. A. Brooman, 166, Fleet-street—An improved method of treating the hop plant to obtain a material resembling wool. (A com.)

2112. W. Evans, Willow-walk, and E. Concanen, Cheshunt-terrace, Grange-road, Bermondsey—A new manufacture of pens or writing instruments.

Dated 24th August, 1861.

2114. M. Hyams, 55, Bath-street, City-road—Imp. in the manufacture of smoking pipes and cigar tubes, and preparing, washing, coating, covering, or otherwise impregnating them with aromatic substances in a solid, liquid, or aeriform state.

2116. W. Clissold, Dudbridge Works, near Stroud—Improved apparatus for oiling wool.

2118. H. B. Coathupe, Junior United Service Club, St. James's—Imp. in timekeepers.

Dated 26th August, 1861.

2128. J. C. Haddan, Bessborough-gardens, Pimlico, and C. Minasi, St. James's-terrace, Camden-town—Imp. in the manufacture of projectiles and of cartridges.

2130. H. Attwood, Wapping-wall, Middlesex—Imp. in cleansing and in feeding boilers.

Dated 27th August, 1861.

2134. J. Smith and W. Smith, Keighley, Yorkshire—Imp. in spindles and flyers used in machinery for spinning and twisting fibrous substances.

2136. J. B. Fondu, Lodelinsart, Belgium—Imp. in the construction of fire grates for steam and other boilers, and suitable to all kinds of fires.

2138. R. A. Brooman, 166, Fleet-street—Imp. in the construction of temples or stretching rollers for looms. (A com.)

Dated 28th August, 1861.

2140. A. Granger, Holborn—Imp. in the manufacture of shirt collars and fronts, wristbands or cuffs, neck ties, or other similar articles of wearing apparel.

2142. B. Browne, 52, King William-street—An improved process and apparatus for concentrating ores or tailings or separating pulverized mineral substances of different kinds or qualities from each other. (A com.)

2144. T. Bray, Dewsbury, Yorkshire—Imp. in ornamenting wood in imitation of inlaid work.

Dated 29th August, 1861.

2148. S. Corbett, Park-street Works, Wellington, Salop—Imp. in mills for crushing and grinding mineral and vegetable substances, and for hulling or shelling beans and oats and other grain and seeds.

2149. J. Harding, Manchester—An improved Inverness cape.

2150. J. Love, Lower Brook-street, Grosvenor-square—An improved signal. (A com.)

2151. V. A. Janvier, Wilton-square, New North-road—Imp. in fastenings for gloves, belts, and other articles.

2152. P. Jewell, Bond-street, Brighton—Imp. in concertinas.

2153. A. V. Newton, 66, Chancery-lane—Improved machinery for cleaning rice and other grain. (A com.)

Dated 30th August, 1861.

2159. A. Taille, Agen, France—An improved manufacture of manure.

2161. H. W. Spencer, Stepney-causeway, Commercial-road—Imp. in the manufacture of animal oils, the said imps. relating more particularly to the processes of refining them to be used for lubricating purposes.

2163. J. Harris, Hanwell, Middlesex—Imp. in stopping or retarding railway and other carriages and trains, locomotive and stationary engines and machinery, together with apparatus employed therein, which apparatus is applicable to the raising and lowering of weights and other purposes for which power is required.

2165. C. Worms and J. Warburton, Bradford—Imp. in treating animal fibre recovered from rags, composed of mixed animal and vegetable fibre.

2167. H. Brand, Guildford-place, Clerkenwell—Imp. in mattresses formed with springs.

Dated 31st August, 1861.

2171. P. Taylor, City-road, Hulme, Manchester—Imp. in apparatus for removing the sediment from, and preventing incrustation in, steam boilers.

2173. W. Southwood, 7, Barkham-terrace, Saint George's-road—An improved method of making boots and shoes, or of parts thereof.

2175. J. Copple and E. Copple, Eccleston, near Prescot, Lancashire—Imp. in apparatus to prevent over winding at coal and other mines.

2177. J. Jones, 55, North John-street, Liverpool—Imp. in clasps or fastenings for garments, belts, harness, and like articles.

2179. J. M. Dunlop, Manchester—Imp. in cleansing cotton seeds, and in machinery used for such process.

Dated 2nd September, 1861.

2187. J. Hall, Oldham—Imp. in portable pumps or engines for extinguishing fires and other purposes.

2189. E. Alcan, Coleman-street-buildings—Imp. in machinery for carding and combing wool and other filamentous substances. (A com.)

2191. G. Knight, Foster-lane—Imp. in giving lustre to written and printed letters, figures, and devices.

Dated 3rd September, 1861.

2193. D. Ward, Beaminster, Dorsetshire—Improved machinery for twisting and laying flax, hemp, and other fibrous materials.

2195. E. Suckow and E. Habel, Oldham—Imp. in machinery or apparatus for producing a strong blast or current of air.

Dated 4th September, 1861.

2199. T. Scott, Newcastle, Down, Ireland—Imp. in the construction of roadways.

2201. W. E. Newton, 66, Chancery-lane—Imp. in self-acting brakes applicable to railway or locomotive engines and carriages. (A com.)

PATENTS SEALED.

[*From Gazette, September 13th*, 1861.]

September 12th.

622. J. L. Jullion.
635. G. Simmons.
637. E. T. Truman.
638. E. A. Pontifex.
641. B. Samuelson.
646. J. Marson.
650. W. Lorberg.
651. C. J. Burnett.
653. E. Green and J. Green.
654. A. Smith.
657. J. Watkins.
663. J. I. Taylor.
664. J. Holden.
665. A. Drevelle.
667. F. Jenkin.
668. E. C. Morgan.
669. A. Prince.
670. W. F. Henson.
671. E. E. Scott.
678. C. N. Kottula.
682. J. S. Miller & T. P. Miller.
687. B. West.
690. G. W. Hawksley and M. Wild.
694. J. Watson and T. B. Davidson.
705. M. J. F. Chappellier.
710. W. Andrews.
727. S. Jackson.
746. S. A. Beers.
754. G. F. Morrell.
756. S. Lamb.
764. W. Grimshaw.
856. W. E. Gedge.
871. W. Westbury & E. Cooke.
906. J. C. Rivett.
987. G. A. Huddart and J. D. E. Huddart.
1028. T. Greenwood.
1339. G. Asher.
1582. J. Cullen.
1716. J. R. Black and H. W. Spratt.
1738. F. S. Barff.
1769. E. Briggs and S. Fearnley.
1847. J. H. Johnson.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, September 13th*, 1861.]

September 9th.

2086. R. Lakin and J. Wain.

September 10th.

2050. J. L. Chester.
2058. D. Cheetham.
2064. J. M. Courtauld.

September 11th.

2069. L. Kaberry and T. Mitchell.

[*From Gazette, September 17th*, 1861.]

September 12th.

2109. A. Turner.
2123. J. Dewrance.
2151. G. L. Turney.
2284. J. Braby and J. Braby, jun.

September 13th.

2087. A. H. J. Bastable.
2090. F. Fowke.

September 14th.

2107. J. G. N. Alleyne.
2121. J. Bethell.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, September 13th*, 1861.]

September 9th.

2047. E. Sharpe.

Journal of the Society of Arts.

FRIDAY, SEPTEMBER 27, 1861.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £430,500, have been attached to the Deed.

Guarantors who have not received Ivory Passes to the Exhibition Buildings are requested by the Contractors to apply for them to the Secretary of the Society of Arts, John-street, Adelphi, London, W.C.

Her Majesty's Commissioners have issued the following decisions:—

Medals.

"Prizes or rewards of merit, in the form of medals, will be given in Sections I., II., III."

(*a.*) These medals will be of one class, for merit, without any distinction of degree.

(*b.*) No exhibitor will receive more than one medal in any class or sub-class.

(*c.*) An International Jury will be formed for each class, and sub-class, of the Exhibition, by whom the medals will be adjudged.

(*d.*) Each Foreign Commission will be at liberty to nominate one member of the jury for each class, and sub-class, in which staple industries of their country, and its dependencies, are represented.

(*e.*) The names of the Foreign jurors must be sent to Her Majesty's Commissioners before the 28th of February, 1862.

(*f.*) The British jurors will be chosen in the following manner:—

Every exhibitor will name three persons to act on the jury for each class, or sub-class, in which he exhibits, and, from the persons so named, Her Majesty's Commissioners will select three members of the jury for each such class or sub-class.

(*g.*) Her Majesty's Commissioners reserve to themselves the power of modifying these arrangements, in any particular case where it may appear to them that the strict application of the principles of these decisions would be attended with injustice.

(*h.*) The names of the jurors will be published in March, 1862.

(*i.*) The juries will be required to submit their awards, with a brief statement of the grounds of each, to Her Majesty's Commissioners, before the last day of May, 1862.

(*j.*) Should the reasons assigned for any award appear insufficient, or should no reason be given, Her Majesty's Commissioners reserve to themselves the right of confirming or rejecting it.

(*k.*) The awards will be published in the Exhibition Building, at a public ceremony, early in the month of June, 1862.

(*l.*) They will immediately afterwards be conspicuously attached to the counters of the successful exhibitors, and the grounds of each award will be very briefly stated.

(*m.*) If an exhibitor accepts the office of juror, no medal can be awarded in the class, or sub-class, to which he is appointed, either to himself individually or to the firm in which he may be a partner.

(*n.*) The medals will be delivered to the exhibitors on the last day of the Exhibition.

Processes of Manufacture.

Besides making arrangements for showing machinery in motion, and illustrating it by processes, her Majesty's Commissioners will reserve space for the exhibition of processes of manufacture, in certain handicrafts which can be carried on without danger in the building. They consider that it will be interesting to the general public to have an opportunity of seeing the following and similar processes, and will reserve sufficient space for showing one illustration of each of them:—

Steel pen making.
Pin making.
Needle making.
Button making.
Medal striking.
Gold chain making.
Engine turning for watches, &c.
Type casting.
Type printing by hand.
Lithographic printing.
Copperplate printing.
Earthenware printing.
Porcelain printing.
A potter's wheel.
Brick and drain tile making.
Glass blowing on a small scale.
Turning in metal, wood, and ivory.
Glove making, &c.
Pillow lace making of various kinds.

Applications to exhibit these processes, with full particulars of the space required, and of any special preparations which may be necessary, should be addressed before the 1st of November, 1861, to F. R. Sandford, Esq., 454, West Strand, London, W.C.

THE BRITISH COLONIES AND THE INTERNATIONAL EXHIBITION.

By P. L. Simmonds.

No. IV.—The Australian Colonies.

The British nation seldom takes stock of its colonial possessions, and the condition of these, as regards their progress, is usually roughly estimated by current facts and figures, rather than by any careful comparison of the present and past. The material wealth of the world, and the advancing influences of commerce and civilisation, move on so rapidly, that a backward glance of some years into the past, creates surprise even in the most unreflecting mind. We have just been taking a census of the population of the United Kingdom, and the present offers a not inappropriate time for looking into the condition of the great Australian Colonies. The more especially does this seem a fitting inquiry, as ten years have elapsed since the Great Exhibition of 1851—and they are all making active and earnest preparations to be duly represented at the International Exhibition which is to be held in London next year. How interesting, then, will be the retrospect; as well as the comparison of the now and then. What amazing strides have those colonies, individually and collectively, made—an advance in every element of prosperity certainly unequalled in any other quarter.

In another column I have collected and arranged with considerable research a series of statistical returns, which will serve to show by comparison the astonishing advance

of Australia, and these figures deserve a careful study. Columns of figures, it is true, at the best of times are not very attractive, but the comparative results shown are such as will fully repay even a cursory glance over the tables. I will, however, summarise some of the principal facts which these statistics elicit. I have endeavoured to limit the comparison to the past ten years, but it has not been possible in all cases to obtain the official returns for the last year or two. The statistics given are, however, ample for the comparisons required.

Firstly, we find that the population of these colonies has more than doubled in the ten years, the chief addition being made by more than half a million of emigrants from the United Kingdom. The progressive increase of population has been great in all the colonies, but Victoria, from the influence of its gold-fields, shows the largest increase, having advanced from 77,345 souls in 1850, to 530,262 in 1859. Some important territorial changes have taken place in Australia since 1851, which require preliminary notice. The settlement of Port Phillip, which had, in 1851, only been just erected into a separate colony, has now become the principal colony of the group. The northern portion of New South Wales, formerly known as Moreton Bay, has, within the last two years, been separated, and made an independent colony, under the name of Queensland; and by the energy of its governor and leading men is making great strides in progress, and attracting a large share of notice at home. Norfolk Island, formerly a convict settlement and dependency of New South Wales, has been colonised by the Pitcairn Islanders, about 200 in number, to whom a romantic interest attaches, as the descendants of the mutineers of the *Bounty*, and who had kept up their primitive simplicity and isolation, until they had outgrown the limits of their former island home. Van Diemen's Land, having ceased to be a convict colony, has changed its name to Tasmania—certainly a more euphonious title. In New Zealand, Canterbury, and some other new settlements have been founded, and several new provinces created.

The land under cultivation in Australia has more than doubled in the ten years, and it is satisfactory to find that the greatest progress in this respect has been made in Victoria, notwithstanding the general attractions of its gold-fields. This colony bids fair, before long, to be self-supporting, in an agricultural point of view, as regards grain, forage, and root-crops, for which it has drawn largely hitherto upon the surrounding colonies. The live stock in the colonies have also about doubled, with the exception of sheep, which have increased more slowly. There are two causes for this—the larger demand for slaughter, owing to the increased population, and the deficiency of shepherds and pastoral labour generally. The clip of wool has by no means declined; on the contrary, there is an advance of nearly 50 per cent. in the shipments in the last ten years, of which more than one-third is exported by Victoria.

Another most important Australian product is its gold; and this, though chiefly concentrated in Victoria, is also obtained in smaller quantities in four of the other colonies. It is computed, on good authority, that within the last ten years more than £111,000,000 sterling of gold has been obtained in Australia. It cannot be denied that to these gold discoveries Australia owes much of her existing prosperity and population. To enumerate all the benefits that have resulted from this flow of wealth and tide of population would be impossible; although it cannot be denied that much individual misery and disappointment have been mixed up with this general advance. But to the industrious and willing hand there is no room for permanent failure—success is certain.

The permanent improvements in Australia are very striking. Railways, and telegraphs, and improved roads have been widely extended. Steam navigation has been carried into the far interior by the Murray and Darling, and their tributaries. Magnificent buildings have been erected in town and country; towns and villages have sprung up over the length and breadth of the land; pastoral operations have been extended, and the several colonies brought into closer and more frequent communication.

Ship-building and the progress of the Colonial Marine is another important feature of consideration. In 1850, the vessels belonging to Australia and New Zealand numbered 779, of 56,836 tons. In the close of 1859, the number of colonial registered vessels had increased to 1,379, of 147,151 tons, of which 106, registering 12,734 tons, were steamers. Besides these, there are the several vessels belonging to the Intercolonial Steam Navigation Company, and other British registered steamers, navigating the Australian seas. The greater part of the colonial craft employed have been built in the colonies, and some very fine vessels, sail and steam, have been turned out in Sydney, Melbourne, Hobart Town, and New Zealand.

The aggregate revenue of the Australian Colonies has risen from £1,250,000 to £6,000,000 per annum; their external trade (imports and exports), from £8,250,000 to £47,000,000 sterling! If we could estimate the value of the fixed property and improvements generally, and the enhanced value of land, we should also find much to surprise us in the immense advance which Australia has made, in these respects, in so brief a period.

As regards the general current of trade, this progress has been equally beneficial, since most of its business relations are carried on with the United Kingdom.

In 1850, the value of the British produce and manufactures exported to our settlements in Australia was but £2,602,253; in 1859, it had reached £11,229,448. The average annual value of the British exports to that quarter, in the first five years of the decade, was £7,950,716; in the last five years, it averaged £10,589,015, or at the rate of nearly £10 per head of the population. The net value of the imports of merchandise from Australia, in the past five years, has averaged £5,851,503, exclusive of the gold.

Glancing at the special shipping trade between the mother country and the Australian colonies, we find this has steadily advanced, although not maintained at the enormous stimulus which it received just after the gold discoveries. In 1851 the vessels entered inwards from Australia and New Zealand were 132, of 61,561 tons; and the ships cleared outwards for Australia were 281, of 148,123 tons. In 1853 and 1854 the average tonnage cleared from the United Kingdom for Australia, was 526,000 tons. In 1859, the number of vessels that entered inwards from Australia was 177, of 153,890 tons; and the clearances for Australia were 513 ships and 411,846 tons. Last year there was a falling off in the amount of the trade.

In the forgoing observations, I have taken a hasty summary of Australian progress generally, preliminary to a more special and detailed notice of the separate progress and condition of the colonies, past and present, and of the exertions each is making to be duly represented in all the details of its varied industry at the International Exhibition of 1862. From the official information already received, the Australian Colonies bid fair to be more fully and creditably represented than any of the other British possessions.

Statistics of the Australian Colonies, showing the Progress made in the last Ten Years. Compiled from Official Returns by P. L. Simmonds.

Population (exclusive of Aborigines).

Colony.	1850.	1859.
New South Wales & Queensland	265,503	342,062
Victoria	77,345	530,262
South Australia	63,700	127,000
Western Australia	5,886	14,837
Tasmania	68,609	90,000
New Zealand	22,408	61,263
	503,451	1,165,424

EXTERNAL TRADE.—VALUE OF EXPORTS AND IMPORTS.

Colony.	Exports from.		Imports into.	
	1850.	1858.	1850.	1858.
	£	£	£	£
New South Wales	1,357,784	4,186,277	1,333,413	6,059,366
Victoria (1851)............	1,422,909	13,989,209	1,056,437	15,108,249
South Australia	570,817	1,512,185	845,572	1,769,352
Western Australia	22,135	78,648	52,351	144,931
Tasmania	613,850	1,151,609	658,640	1,328,612
New Zealand	116,416	458,023	240,205	1,141,273
	4,102,911	21,375,951	4,186,518	25,551,783

TOTAL LAND UNDER CULTIVATION.

Colony.	1850.	1859.
	Acres.	Acres.
New South Wales..................	144,647	217,443
Victoria (1852)	57,298	358,727
South Australia......................	64,728	270,000
Western Australia....................	7,391	37,137
Tasmania	168,819	208,619
New Zealand..........................	22,058	141,007
	464,941	1,032,933

LIVE STOCK IN 1850.

Colony.	Horses.	Cattle.	Sheep.
New South Wales...	111,458	1,374,968	7,092,209
Victoria (then Port Phillip............	16,495	386,688	5,130,277
South Australia	6,488	68,296	897,866
Western Australia...	2,100	11,000	142,000
Tasmania	18,391	82,761	1,822,322
New Zealand.........	2,723	29,887	160,166
	157,655	1,953,600	15,244,840

LIVE STOCK IN 1859.

Colony.	Horses.	Cattle.	Sheep.
New South Wales ...	200,713	2,110,604	7,581,762
Victoria	68,323	699,330	5,578,413
South Australia* ...	49,339	278,265	2,824,811
Western Australia* .	8,386	30,990	234,715
Tasmania*	20,559	81,737	1,760,847
New Zealand	14,912	137,204	1,523,324
	362,232	3,338,132	19,503,872

* 1860.

GOLD RAISED IN AUSTRALIA IN TEN YEARS.

Years.	Victoria.—Officially recorded Exports, Value.	New South Wales.—Ozs. Valued 77s. per oz.	South Australia.	Tasmania.
	£	Ounces.		Ounces.
1851	580,587	108,464	An average of about 5,000 ozs. yearly has been obtained in this colony since 1852, worth about 80s. per oz.	77
1852	10,899,733	233,862		44
1853	12,600,083	212,501		34
1854	9,568,262	109,895		5
1855	11,172,261	104,092		270
1856	11,942,783	138,823		249
1857	11,046,113	148,126		126
1858	10,112,752	255,535		572
1859	9,122,702	289,283		
1860	8,000,000	260,000		
Estimated as unrecorded..	7,000,000	372,116		400
Total value	102,045,276	£8,595,883	£180,000	£7,108

In New Zealand about 55,000 ounces of gold have been obtained since 1857; in 1857 and 1858 the gold exports thence amounted to £92,886; the value of which, added to the foregoing, gives a total of £111,048,267.

REVENUE OF THE AUSTRALIAN COLONIES.

COLONY.	1850.	1859.
	£	£
New South Wales...........	375,729	1,540,550
Victoria (for 1851)............	379,975	3,257,724
Tasmania	134,241	310,228
South Australia................	260,561	601,500
West Australia	19,137	52,804
New Zealand..................	82,261	341,655
	1,251,904	6,104,461

DECLARED NET VALUE OF THE TOTAL EXPORTS OF BRITISH PRODUCE, &c., FROM THE UNITED KINGDOM TO AUSTRALIA, IN THE LAST TEN YEARS.

	£		£
1851	2,807,356	1856	9,912,575
1852	4,222,205	1857	11,632,524
1853	14,513,700	1858	10,463,032
1854	11,931,352	1859	11,229,448
1855	6,278,966	1860	9,707,499

Besides the above, about £1,300,000 (in value) of foreign and colonial merchandise is annually exported.

COMPUTED NET VALUE OF THE IMPORTS INTO THE UNITED KINGDOM, FROM EACH AUSTRALIAN COLONY, IN THE LAST SIX YEARS.

COLONY.	1854.	1855.	1856.	1857.	1858.	1859.
N. S. Wales.	1,711,972	1,589,874	2,317,591	2,035,386	1,930,147	1,808,995
Victoria, exclusive of gold...	1,651,649	1,798,790	2,033,654	2,472,479	2,110,277	2,427,820
S. Australia, ditto	433,763	537,939	661,886	653,180	517,552	663,459
W. Australia	35,288	32,392	46,972	43,927	47,941	93,261
Tasmania...	429,924	508,016	576,296	563,113	423,832	499,486
New Zealand	39,262	33,190	100,644	157,220	261,538	341,634
	4,301,92[illegible]	4,500,2[illegible]0	5,736,043	5,925,305	5,291,287	5,834,655

IMPORTS FROM AUSTRALIA.

	Gold (officially registered.)	Wool.
	£	lbs.
1851.........................	—	41,810,117
1852.........................	—	43,197,301
1853.........................	—	47,076,010
1854.........................	—	47,489,650
1855.........................	—	49,142,306
1856.........................	—	52,052,139
1857.........................	—	49,209,655
1858.........................	9,064,763	51,104,560
1859.........................	8,624,566	53,700,542
1860.........................	6,719,000	59,166,616

DECLARED VALUE OF THE EXPORTS OF BRITISH PRODUCE AND MANUFACTURES SENT TO THE AUSTRALIAN COLONIES AND NEW ZEALAND, 1852—1860.

	N. S. Wales and Queensland.	Victoria.	South Australia.	Western Australia.	Tasmania.	New Zealand.
1852*	1,632,137	1,615,135	276,545	55,647	493,772	148,969
1853	4,527,775	7,062,387	1,182,885	100,917	1,408,927	230,809
1854	4,145,267	6,423,283	1,262,096	70,122	1,183,789	311,429
1855	2,235,760	3,245,788	686,473	92,084	685,144	276,376
1856	3,003,263	6,517,745	931,117	78,263	741,512	400,489
1857	3,596 695	7 511,110	988 610	75,627	694,979	408,204
1858	2,919,544	5,417,601	979,973	82,234	573,175	490,507
1859	2,876,353	6,467,652	653,148	118,045	481,343	632,907
1860	2,483,190	5,378,083	811,048	98,884	632,907	568,769

* The returns for each colony are not particularized for 1851, but the total value in the year was £2,807,356, against £9,707,499 in 1860.

Computed Net Value of the Total Imports of Merchandise from the British Settlements in Australia, in the Years Specified, including New Zealand.

1854	£4,301,867
1855	4,500,200
1856	5,736,043
1857	5,925,305
1858	5,291,287
1859	5,834,641
1860	6,470,241

The real value was not estimated before 1854.

Number of Emigrants from the United Kingdom to the Australian Colonies and New Zealand in the last Ten Years.

1851	21,532
1852	87,881
1853	61,401
1854	83,237
1855	52,309
1856	44,584
1857	61,248
1858	32,295
1859	31,013
1860	24,302
Total	508,802

NICKEL COINS.

The following communication has been received from J. W. del Campo, from Holland:—

"Some time since a change in the coins was made in the kingdom of Belgium by introducing nickel coins, as had been the case a few years before in Switzerland. In Belgium, as in France and Holland, the decimal system prevails, which is distinguished favourably over other modes of division, and it is much to be desired that such a system was introduced in England and Germany. It is true that in both countries efforts have been made to adopt it, but hitherto without success. In England particularly, the copper-money is very inconvenient, as well to those who have to make large payments to the working class as to all who have to receive money whether in large or small quantities. The large copper coins have a disagreeable smell, and are ugly; the new ones, it is true, are smaller, but still too large. On the Continent silver pieces are used, and the Belgian Government passed a law, on the 20th December, 1860, that coins of a halfpenny, a penny, and two-pence, should be made of copper, containing 20 per cent. of nickel. This is considered to be a great improvement. Nickel coins look like silver; they are small, light, and do not smell or oxidate.

"I have the honour to offer the Society of Arts a specimen of nickel coins. The weight of a nickel penny* is 4½ grammes (about 1 dram); that of an English penny 50·4 grammes (10⅝ dr.); half-penny and two-pence pieces, weigh 3 and 7 grammes.

"Nickel mines are found in Belgium, and are worked.

"The nickel ore is heated to drive away the arsenic, which it always contains, then mixed with sand and carbonate of soda, and heated again, when the pure nickel metal is separated on the bottom of the furnace.

"Nickel is used to a large extent in the manufacture of ornaments, which have the appearance of silver.

"Nickel oxide N_2O_3 is used to colour glass and porcelain. It is black coloured, but, as I have remarked, it is not easily formed on the coins."

* Nineteen Belgian pence = Twenty English pence.
One gramme = one-thousanth of a pound (*livre*).
One *livre* = 0·454 English pound.

THE OAR.

Probably the most ancient mode of propelling boats through the water by hand-labour was by means of oars, of nearly the same shape, and worked in the same manner, as those now in use; and to all appearance there is no likelihood of a change, for although many savage tribes work their canoes and other narrow boats with hand-paddles, and attain great speed with them, yet seamen of civilised nations, whose boats are mostly of a more burdensome character, and whose bodies are encumbered with clothing, have, without exception, given preference to the oar, as an instrument of greater power, and worked with more convenience.

And, truly, there is no more beautiful instrument than an oar, when we consider its simplicity, the ease with which it is worked, and the readiness with which its position is accommodated to the ever-varying motion of the boat and the sea's surface. It has often been proposed—indeed, it is a favourite notion with theorists—to propel life-boats by rotatory paddle-wheels and screws, such as those of steamers, but the proposition is altogether an impractical one, and its trial could only result in failure. Where great power and velocity of motion can be applied, as by steam, undoubtedly the rotatory form is the most convenient mode through which to apply it, and accordingly both screws and paddle-wheels work advantageously, until the rolling or pitching motion of a ship becomes very violent, when a great waste of power ensues; for instance, when a ship rolls so deeply that the paddles are alternately too deeply immersed, and spinning round in the air; or if a screw ship, when she pitches so much that the screw is raised to the water's surface, or lifted above it. When, therefore, it is considered how much more violent is the motion of a boat in a heavy broken sea than that of a ship, it will be readily conceived that a fixed machine, such as a wheel or screw, even if it could be worked on so small a scale by steam power, would do so at a still greater disadvantage. Whereas the oar, obedient to the quick eye and ready arm, varies its position with every motion of the boat or wave, and in skilful hands is always working at "full power."

But there is another point of importance, not to be lost sight of. A paddle-wheel or screw cannot be worked in a life-boat by steam power, but must be so by means of a crank worked by hand. Now it is known to every one that the muscles of the human body are strengthened by use, and that, therefore, persons engaged on any particular bodily labour have those muscles especially strengthened that are constantly brought into play. Thus, a sailor would stand little chance in a walking-match with a professional pedestrian; whilst the latter would as vainly attempt to overtake the former in a race over his ship's mast-head. It follows then, that, apart from its other advantages, the oar is possessed of this especial one, that it is in daily use by the only class of men on the coasts who are available to form the life-boat's crew, viz., the hardy race of fishermen and boatmen who earn their daily bread on our shores.

An oar being, then, the only instrument by which a a life-boat can be propelled, too much care cannot be bestowed on it. Its size, weight, length, material, width of blade, balance, mode of attachment to the gunwale; its height above the water, and above the thwart on which the rower is seated, and the distance of the thwarts and oars apart, are all points of much importance, on which the speed of the boat, or its power to make way against a head-sea much depend.

An oar is a simple lever, of what is termed the second order, that is, wherein the weight or body to be moved lies between the fulcrum and the motive power; the water being the fulcrum of the lever, the gunwale of the boat the point at which its power is applied to the moving body or weight, and the rowers' arms being the source of power.

Fir oars have always been considered the most desirable for life-boats, as they do not bend so much as ash oars, and as they float much lighter in the water, and will therefore

better support any persons in it in the event of accident. Experiments have been made by the National Life-Boat Institution to test the relative strength of oars, when it was ascertained that an oar made from a good white Norway batten, or from a white Baltic spar, will bear as great a strain as any other, each being as free of knots as possible.

The length of an oar must of course be proportional to the width of the boat, and it should be so poised on the gunwale that the rower can raise or depress it or move it in any direction with the smallest effort. An oar should be not less than five inches wide in the blade, or it will expose so small a surface to the water as to cut through it, and so work on a too yielding fulcrum, with comparative loss of power.

The height above the thwarts of the thowl or rowlock in which the oar works on the gunwale, should be sufficient to enable the rower to lift the blade well above the waves by depressing the loom or handle; but, on the other hand, it must not be so high as to require him to raise his arms above the level of his chest in rowing, in which case he will row with much less force, and be much sooner fatigued. A height of eight inches from the thwarts to the oar on the gunwale will be found a suitable average.

Lastly, the mode of confining the oar to the gunwale of the boat is of much consequence. The most common modes, in ordinary boats, are rowlocks and double pins, between which the oar works, but as an oar is liable to jamb in the rowlock or between the pins, when rowing in a rough sea, and thereby to get broken, or to damage the gunwale, the oars of life-boats have generally been worked in a rope grummet or ring, over a single iron thowl-pin; a further advantage of this plan being that it enables the oars to lie along the outside of the boat when not in use and thus saves the necessity of unshipping them and getting them in-board on going alongside a wreck, which is a great advantage.

FIG. 1.

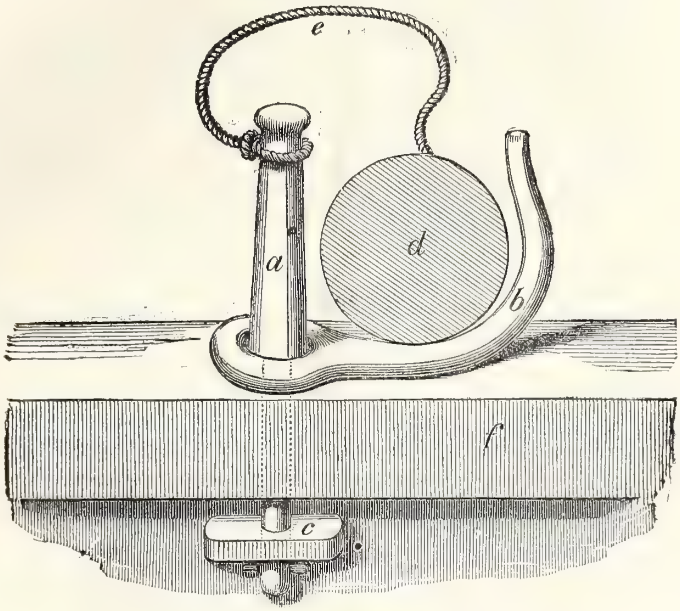
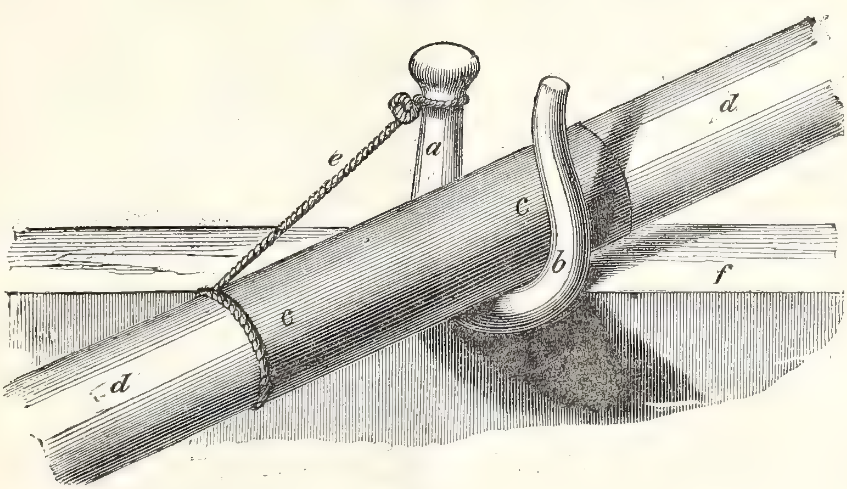


FIG. 2.



A new description of swivel-crutch, intended as a substitute for a grummet, has recently been planned for the National Institution's life-boats, by its inspector, Captain Ward, R.N., which is found to have the advantages of the grummet, and to be more convenient in some respects.

As it will be found to be a very useful kind of crutch for general use in boats, a sketch of it is given (see preceding page).

Figure 1 represents the inside of a boat's gunwale, with a section of the oar within the crutch, the latter supported on the gunwale in the position in which it remains whilst the oar is in use. *a* is an ordinary iron thowl-pin; *b*, the crutch, also of galvanized iron, which revolves round the thowl as an axis; *c*, a clamp or chock, which receives the lower end of the thowl; *d*, a section of the oar; *e*, a short laniard with a running eye, which is slipped over the head of the thowl whenever the oar is required to hang over the side; *f*, the gunwale.

Figure 2 shows the oar when let go by the rower and allowed to hang alongside outside the gunwale. *a*, the thowl; *b*, the crutch; *c*, the leathering on the oar, to prevent chafe; *d*, the oar as hung alongside; *e*, the laniard spliced round the oar, below the leathering, and nailed on to prevent its slipping round or along the oar; *f*, the gunwale.

The principal advantage of the swivel-crutches over grummets is, that they are of a more durable character, are fixtures, and so not liable to be mislaid or lost, and retain always the same size and shape, whereas a grummet is liable to stretch by use, when the oar will work too loosely in it.

INTERNATIONAL PHILANTHROPIC CONGRESS OF 1862.

It appears from papers in French, of which abstracts are subjoined, that the Fourth Session of the International Philanthropic Congress is to be held in London next year, on the occasion of the Great Exhibition. Among the noblemen and gentlemen who have expressed their concurrence are, Lord Brougham and the Council of the National Association for the Promotion of Social Science, the Earl of Shaftesbury, the Earl Ducie, the Earl Fortescue, Lord Ebury, Lord Raynham, the Right Hon. W. Cowper, M.P., Sir Thomas Phillips, Alderman Mechi, Mr. Harry Chester, Mr. Samuel Gurney, M.P., Mr. Edwin Chadwick, C.B., Mr. Henry Roberts, Mr. George Godwin, F.R.S., Mr. T. Twining, Dr. Sutherland, F.R.S., and Dr. Southwood Smith, F.R.S.

Extract of Letter from Monsieur Ed. Ducpetiaux to T. Twining, Jun., Esq.

MY DEAR FRIEND,—In a recent interview with the Viscount de Melun, President of the Société d'Economie Charitable, of which I am one of the Vice-Presidents, we discussed the question of the next meeting of the Congrès International de Bienfaisance, which has held its three previous meetings, at Paris in 1855, at Brussels in 1856, and at Frankfort in 1857.* After mature deliberation, we think that the Fourth Session might be convened in London in 1862, on the occasion of the International Exhibition of the Products of Industry and Art of all Nations. But it is necessary that we should obtain the co-operation either of the National Association for the Promotion of Social Science, or of a Special Committee of eminent and influential persons, animated by the same feelings as ourselves, and who would be disposed to act with us.

Be pleased, therefore, to communicate these lines to the persons you may deem best qualified to aid in carrying out this project. It is closely connected with the Exhibition, where amid the results of the industry of the civilized world, the condition of those who produce these results will most naturally rise to mind. Production is assuredly an admirable thing, but the producer has also some claim to our attention and solicitude. This will not be denied in a country which stands foremost in the number and importance of its useful and charitable institutions.

If, as we hope, our project be entertained, it will only remain to take the steps necessary to carry it out. With this object, the Committee of the Société d'Economie Charitable of Paris places itself at your disposal. If deemed necessary, it will send delegates to London, at any time specified, to arrange the mode of procedure, the constitution of the Committee entrusted with the organisation of the Congress, the programme of its operations, the time of meeting, &c.

Believe me, &c.,
ED. DUCPETIAUX.

A Circular, in the French language, of which the following is a translation, has been extensively circulated abroad:—

SIR,—The Société d'Economie Charitable of Paris, has entrusted to me the preliminary steps for convening the Fourth Session of the International Philanthropic Congress, in London, in 1862, on the occasion of the Great Exhibition. Thanks to the co-operation of the National Association for the Promotion of Social Science, the steps taken hitherto have been completely successful, and the list of adherents already includes a considerable number of persons eminent by position and for their philanthropic sentiments. A committee of organisation will be formed without delay, to fix the date and programme of the meeting, of which notice will be duly given.

The committee will endeavour to turn to the best account the resources which the Exhibition will offer in a benevolent point of view, by ascertaining what articles are most deserving of the attention of the Congress, and by making every necessary arrangement in order that the visits of inspection may be both easy and productive of practical results. It is, however, necessary that the members themselves should do all in their power, that while the interests of commerce and luxury are fully provided for, those of Christian charity may be adequately represented.

It is therefore desirable that, in concert with the Commission appointed by your Government, you should endeavour to elicit demands for space* in favour of objects calculated to promote the well-being of the working classes and the poor. The assurance of due appreciation and extensive publicity will be an encouragement to manufacturers whose productions might, under other circumstances, be less remunerative than useful. Your influence might also be beneficially exercised with Societies and individuals able to exhibit models, drawings, collections, or articles, having a philanthropic or an educational tendency.

The subjoined list may suggest some of the desiderata with respect to which your co-operation would be most valuable:—

ARCHITECTURE.—Models, Plans, and Working Drawings of Buildings conformable to the princples of hygiene, and intended for the use or benefit of the working classes; *e.g. Cités Ouvrières*, Model Dwellings for Town and Country, Hospitals and Asylums, Infant Nurseries, Baths and Washhouses, Working Men's Coffee-houses, Public Slaughter-houses, Depositories for the Dead.

BUILDING MATERIALS.—Cheapness, Durability, Impermeability, &c.

COTTAGE FURNITURE.—A Sanitary Committee, appointed by Her Majesty's Commissioners for the International Exhibition of 1862, proposes to organise a series of experiments on the relative value of appliances for warm-

* Documents relating to these have been deposited for inspection at the Office of the National Association, 3, Waterloo-place.

* No demands for space by English Exhibitors will be admitted after the 1st of October, 1861, but the demands of Foreign Commissions will be received after that date.

ing, lighting, &c. Manufacturers are also invited to undertake careful experiments,* and to transmit the results to F. R. Sandford, Esq., the Secretary of the International Exhibition of 1862.

CLOTHING.—Fabrics and Articles of Clothing deserving of attention in a hygienic point of view; Costumes for Children and Adults adopted by charitable institutions or public establishments, or customary in certain industrial occupations; National Costumes.

FOOD.—New Resources; Preservation; Purification; Analysis, with respect to the Nutritive Properties, detection of Fraud, &c. (For details, see the Memorandum, entitled "Museums for the Working Classes," to be had at the Society of Arts.)

PUBLIC SAFETY.—HYGIENE.—Protection against inundations, &c.; Drainage; Sewerage; Water Supply; Ventilation; Prevention of damp, smoke, &c.; Cheap Hygienic and Medical Appliances; Means of Relief for Infirmities of every kind, and of occupation for the Infirm; Improved Ambulances; Protection against Beasts of Prey, Vermin, &c.; Means of Relief for cases of Poisoning, Asphyxia, &c.; Means of Safety against Shipwreck, Fire, Railway Accidents, &c.; Protection against excessive Heat and Cold; Means for the prevention or relief of the Injuries and Diseases to which the Working Classes are liable in the exercise of their occupations (See the Memorandum mentioned above); Contrivances for lightening Labour, for acilitating conveyance of Burthens, &c.

POPULAR EDUCATION.—This important department could not be overlooked in an Exhibition organised by the Society of Arts, whose influence has of late years been so successfully directed to the education of the industrial classes. A Committee, which includes men of eminence in this department, has drawn up a detailed list of educational appliances, which may be obtained on application, either to F. R. Sandford, Esq., Office of the International Exhibition of 1862, 454, Strand, London, or to P. Le Neve Foster, Esq., Society of Arts, Adelphi, London. The friends of popular improvement will doubtless be glad to co-operate, by promoting the exhibition of everything which their respective countries can supply, best calculated for the education of the poor, and for the easy and agreeable development of the mind, with a view to the practical purposes of life.

I have the honour, &c.,
T. TWINING, JUN.,
Honorary Secretary *ad interim* of the International Philanthropic Congress of 1862.

National Association for the Promotion of Social Science,
3, Waterloo-place, London, Sept. 12, 1861.

EXAMINATION PAPERS, 1861.

(*Continued from page 737.*)

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in April and May last:—

LOGIC AND MENTAL SCIENCE.

THREE HOURS ALLOWED.

All candidates should answer six Logic questions, and four questions in each of the other books which they have studied.

LOGIC.

1. Explain proper, singular, and common nouns, and substantive, attributive, and relative nouns, with examples.

2. Describe generalisation. What is the *summum genus?*

3. What are the rules of logical division? Give examples of their violation.

4. Draw out in proper form the following arguments, and examine their correctness:—

A question cannot be a proposition, for it neither affirms nor denies.

It is so like his handwriting that I am sure he wrote it.

He has a project for improving the plough, therefore I distrust him, as I do all projectors.

The examples of gold, silver, and copper, show that all metals will melt.

Crimes of madness are excused for want of intention; since no one can form a purpose, properly speaking, whose mind is diseased.

No one is rich who has not enough, and as no miser has enough, no miser is rich.

Every one desires happiness; virtue is happiness; therefore every one desires virtue.

Warm countries alone produce wines; Spain is a warm country: therefore Spain produces wines.

Opium is a poison, and therefore physicians sometimes give their patients poison.

Two kinds of things we ought not to fret about; what we can help and what we cannot. (Draw out as a dilemma.)

5. What is the opposition of judgments? Give all the opposites of these, marking which are true and which false.

Old sciences may be taught.
No tyrants are beloved.

6. Explain ambiguous middle term, as a source of falacies, with illustrations.

7. On what principle are we justified in being content with an imperfect enumeration in an induction?

8. What is the modality of propositions? What has been the dispute about its place in logic?

9. Define the following words, mentioning in each case the kind of definition employed:—Science, wealth, originality, wit, animal, gold.

10. "Language records and preserves the results of thought." Explain and illustrate.

11. Give examples of enthymeme, dilemma, and logical example.

12. What are arguments from chance? How do you state the chance that a thing which has occurred seven times will occur again?

PALEY'S MORAL PHILOSOPHY.

1. "What some say of Contracts of Hazard, that one side ought not to have any advantage over the other, is neither practicable nor true." What are contracts of hazard? Explain the meaning of the passage, with illustrations.

2. "Whatever is expedient is right. It is the utility of any moral rule alone which constitutes the obligation of it." Show the perversion of which this *dictum* is capable. Define "expedient" and "right" so as to obviate them.

3. Discuss the question whether promises are binding which are made under fear or compulsion.

4. Explain the theory of a "social compact." Give Paley's objections to it, and describe his theory of submission to civil government.

5. State Paley's views on the object of punishment, the kinds of it, and the extent and the certainty of it.

6. What objections have been taken to Paley's principle of moral science? Give your opinion of their weight.

7. How does Paley prove the unlawfulness of suicide? Criticise his view.

8. Enumerate the different kinds of contract.

BUTLER'S SERMONS.

1. Give a very brief account of the aim of Butler's three sermons upon Human Nature, and of the theory that would be most completely opposed to it.

* Indications of the mode in which it is desirable that these experiments should be performed will be supplied by the Committee.

2. Show that compassion is a natural feeling, and that it works for good both to those who feel it and those who are its objects.
3. What is Bishop Butler's doctrine as to anger and resentment? How do we reconcile it with the duty of forgiveness of injuries?
4. State Butler's rules for avoiding self-deceit.
5. "Knowledge is not our proper happiness." In what connexion does Bishop Butler use these words, and how does he prove them?
6. Give some account of the character of Balaam. How does Butler make this subject bear on the rest of his system?
7. Compare the view of morals in these sermons with any other view with which you may be acquainted.

Stewart's Philosophy of the Human Mind.

1. What does Stewart mean by "men of general views?" How does he distinguish men as to their powers of generalisation?
2. What account does he give of the views of others as to the origin of our knowledge?
3. How much power does the mind possess over the trains of thought suggested to it?
4. What is wit? How much have surprise and readiness to do with it? Criticise Stewart's view?
5. What are the principles on which the culture of the memory depends?
6. How far does *contiguity in time* influence the association of our ideas? Give illustrations.
7. "Imagination is not a simple power of the mind, but is formed by a combination of various faculties." Explain this.

Bacon's Novum Organum.

1. Explain what Bacon means by Idols of the Tribe, and Idols of the Theatre. Give illustrations.
2. What is Bacon's estimate of Logic? How far is it just?
3. What were the principal impediments to Natural Philosophy, as Bacon describes them?
4. "Substance, quality, action, passion, and existence are not clear notions." Explain this. Why do these abstract notions fail of clearness?
5. How does he distinguish the *anticipation* and the *interpretation* of nature?
6. "Our method and that of the sceptics agree in the outset, but differ widely in the conclusion." How is this?
7. What service did Bacon perform for science?

(*To be continued.*)

Home Correspondence.

THE PATENT QUESTION.

Sir,—It seems to be a contested point, whether the granting of letters patent by the government stimulates the inventive genius of the country, or is beneficial to the public.

In order to meet the question fairly, it will be necessary to illustrate a case of constant occurrence. Suppose several establishments in the immediate vicinity of each other are engaged in the extraction of silver from its ore. They resort to the best method then known, which, however, is rude, tedious, affording very small profit for the time, labour, and money expended.

The proprietor of one of these works, dissatisfied with the product by the then existing method, institutes a series of elaborate experiments, covering many years; at last he is rewarded by arriving at a process, which not only yields a much greater per centage of silver, but is much less expensive and more simple in operation.

So great is the improved mode that the rival establishments cannot compete with any chance of success. If they desire to avail themselves of the benefits which have resulted from the scientific labours of their neighbour, it must be on such terms as will remunerate the inventor. Otherwise, having already the monopoly, and no one can compel him to divulge it, he has the secret, which has its intrinsic money value. In fine, it yields ten times more than the possession of a patent, and he refuses all overtures, working the invention to his own profit. He can afford to pay higher wages, and in a short time all his competitors are obliged to close their works, because they cannot contend with the secret process.

There is hardly a branch of manufactures to which this argument will not apply. It is at this juncture that the government, in order to prevent a monopoly of so disastrous a character, steps in, and says to the inventor—"Specify your secret in detail, so that the world shall have the benefit of your investigations and discoveries, and as an equivalent you shall have a limited monopoly, in the form of letters patent." It must be always remembered that if the discovery or invention is not substantially an original one, these letters patent are void.

The most simple and beautiful discoveries have been the adaptation of well-known principles to useful purposes.

Pattinson's chemical knowledge enabled him to apply a most simple principle to a most important improvement in the extraction of silver from lead, merely by the former being fused at 1280° Fahr., while the latter required but 630° to effect the same result. Yet until 1829 no one had thought of making the practical application of these long-known facts, which, however, required much time and experiments to render of practical value.

Both Dr. Wollaston and Sir H. Davy made novel applications of well-known principles.

The intense heat produced by the combination of hydrogen and oxogen gases was applied by Wollaston to the fusing of platinum, a metal which had resisted all attempts at reduction.

Sir H. Davy's safety lamp is based on the conductability of heat by metals.

In fine, all really great discoveries or inventions, from the earliest periods of time, have been but the adaptation of the most simple principles known to science, to the accomplishment of a result in a more complete and beneficial manner than hitherto effected.

The refraction of light when passing from one medium to another, comprises the history of telescopes and microscopes, with their wonderful revelations. The evaporation of water explains to the scientific mind the steamboat, the locomotive, and all the consequences resulting in the relations of mankind. The mere change in the condition of matter envelopes that latent giant, electricity.

The falling of an apple awoke a thought in Newton's mind, which resulted in the discovery of the laws of gravitation.

If men of science devote their time to the attainment of an object, by the application of these simple truths of nature, which eventuate in the improvement of any special department of industry, they should be compensated in accordance with the value and merits of their discovery or invention.

The only equitable patent law is that adopted by the Belgian Government, which divides the payment of the fees, increasing annually—the first year being 10 frs.; the second, 20 frs.; the seventh, 70 frs.; and the twentieth, 200 frs. The patentee is also allowed six months to pay the fee, at the end of each year, by the forfeiture of 10 frs.

Suppose the English patent law was based on this principle, commencing at £1, and increasing each year by the same sum, it would ensure a much larger revenue to the Government, and the payments would be commensurate with the successful working of the patent.

Our present law is most onerous, and calculated to impede the object it is intended to promote, namely, the encouragement of inventive genius.

In the first instance, what with the Government fees and agent's charges, few patents can be secured under £40,

which only protects the inventor for three years, a period which is barely sufficient, under the most favourable circumstances, to develope the value of the patent.

Now another tax is required, of £50, to extend the patent for an extra four years. At this stage, three-fourths of all the patents taken out are allowed to lapse and become void. Nor is the injustice ended, for, at seven years' maturity, £100 is demanded to extend to seven years longer, or fourteen years in all.

It is a grave error to imagine that, in a great number of instances—say half—the patents are allowed to cease because of their being valueless, or not having intrinsic merit, but from the utter inability to meet so heavy a tax. It has become an axiom, "that an inventor is a man without means," and it is true as a rule. The best and most successful inventors are the worse financiers—it is the exception that the inventor or discoverer reaps any real benefit from the patent, this arising more particularly from the unjust mode of levying these exorbitant fees.

The indiscriminate issue of patents to all applicants is fraught with every disadvantage to the original inventor.

The provisional protection should be issued for one year, after having been subjected to a rigid scrutiny by a court of competent examiners. If found to be original and useful, then on the payment of a small fee the certificate should be issued, affording protection to the applicant. The final specification should define the nature of the invention, and the mode of carrying it into effect, in such clear and unambiguous language as to admit but of one interpretation. At present, many specifications are so confused, foggy, and unintelligible, that it is with the greatest difficulty that even an approximation of the real intention of the patentee can be arrived at.

Under the present system patents are applied for and issued merely to obstruct the successful working of other patents, which the applicant of "the obstructive patent" has become accidentally or surreptitiously acquainted with. These and numerous other defects would be effectually remedied by the appointment of competent examiners, who would allow no application to receive provisional protection, except it comprised a substantial, original invention, in the strongest sense of the term.

It is to be desired that the recent ventilation of the patent system, at the British Association and other places, will result in Parliament enacting such measures as will modify and revise the present imperfect system, so as to render of real value the possession of a patent.

I am, &c.,

ROBT. H. COLLYER, M.D., F.C.S., &c.

Bete House, Alpha-road, St. John's-wood, N.W.
Sept. 12th, 1861.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, September 20th*, 1861.]

Dated 11th July, 1861.

1745. W. Cooke, 26, Spring-gardens—An improved wind guard for curing smoky chimnies.

Dated 30th July, 1861.

1900. A. Parkes, Birmingham—Imp. in the manufacture of sheathing metal for ships and vessels.

Dated 1st August, 1861.

1914. E. J. Muggridge, 6, St. John's villas, Adelaide-road, St. John's-wood—Imp. in machinery or apparatus for washing clothes and other textile articles.

Dated 3rd August, 1861.

1925. M. Merryweather and R. M. Merryweather, Long-acre—Imp. in pumps applicable to steam and other fire engines.

Dated 7th August, 1861.

1964. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Imp. in certain descriptions of breech-loading fire-arms. (A com.)

Dated 10th August, 1861.

1995. W. S. T. Clarke, Charing-cross, Westminster—Imp. in railway breaks.

Dated 15th August, 1861.

2031. J. Bethell, 38, King William-street—Imp. in the manufacture from steatite of journals, axle boxes, and bearings for machinery, axles, and spindles to work in smoking pipes, buttons, crucibles, and pots for chemical and smelting purposes, and also of a lubricating compound for railway and other carriages.

Dated 19th August, 1861.

2061. T. Pedrick, 5, Park-place, Brixton—Imp. in obtaining and applying water motive power.

Dated 20th August, 1861.

2063. G. Ingram, Old-street—Imp. in trams to be used in connection with the wheels of carriages on common roads.

Dated 22nd August, 1861.

2097. B. Samuelson, Banbury—Imp. in harvesting machines. (Partly a com.)

Dated 23rd August, 1861.

2107. A. B. Childs, New Oxford-street—Imp. in means to be employed in the dressing or cracking of millstones. (A com.)

Dated 27th August, 1861.

2131. Z. Colburn, 15, Tavistock-street, Bedford-square—Imp. in the arrangement and combination of high and low-pressure steam engines.

Dated 28th August, 1861.

2147. M. Theiler, Einsiedeln, Switzerland—Imp. in type printing telegraphs.

Dated 30th August, 1861.

2154. R. Penrose, Coley Mill, near Halifax—Imp. in screw stocks and dies. (A com.)

2156. R. Shaw, Portlaw, Waterford, Ireland—Imp. in windlasses, capstans, and other machinery for hoisting and lowering weights.

2160. W. E. Gedge, 11, Wellington-street, Strand—Imp. in thrashing machines. (A com.)

2168. W. Clark, 53, Chancery-lane—Imp. in shirts and chemises. (A com.)

Dated 31st August, 1861.

2170. H. Keach, 16, Bedford-terrace, Andover-road, Holloway—An imp. in the ornamentation of woven and other fabrics for garments and parts of garments.

2172. T. M. Jones, Great Pulteney-street—Imp. in apparatus for suspending and turning meat, fowls, and such like articles for roasting.

2174. C. Pemberton, Deptford—Imp. in railway, ship, and other signals.

2181. C. W. Siemens, 3, Great George-street, Westminster—Imp. in apparatus employed in connection with electric telegraphs, part of which imps. are also applicable to ascertain the heat in inaccessible places. (Partly a com.)

Dated 2nd September, 1861.

2184. T. S. Stock, J. S. Stock, and H. Taylor, Birmingham—A new or improved tap or stop cock. (A com.)

2186. W. Muller, 62, High Holborn—Imp. in apparatus for roasting coffee, which imps. are also applicable to the roasting of cocoa and other vegetable matters.

2190. A. N. Saleres, 170, Rue de Charonne, Paris—Imp. in printing and coloring paper, chintz, and other fabrics, and machinery or apparatus for that purpose.

2192. W. Campion and H. Johnson, Nottingham—Imp. in machinery or apparatus for cutting the selvedges or edges of knitted or other fabrics while being stitched.

Dated 3rd September, 1861.

2194. J. Gresham, Manchester—Imp. in mechanism or apparatus for facilitating the stopping and starting of omnibuses and other vehicles.

2196. P. Robertson, Sun court, Cornhill—Imp. in treating yeast, and in the manufacture of ammoniacal salts and a substitute for animal charcoal.

Dated 4th September, 1861.

2200. R. A. Brooman, 166, Fleet-street—A new or improved parachute toy. (A com.)

2202. L. R. Bodmer, 2, Thavies-inn, Holborn—Imp. in distilling apparatus. (A com.)

Dated 5th September, 1861.

2204. J. K. Bayley, T. Harrison, and W. Briggs, Bolton-le-Moors, and R. Parker, Atherton, Lancashire—Imp. in machinery for preparing and spinning cotton and other fibrous materials.

2205. H. Young, Birmingham—Imp. in counter or pillar beer engines.

2206. R. McConnel, Glasgow—Imp. in locks.

2207. J. M. Rowan and T. R. Horton, Glasgow—Imp. in steam boilers and surface condensers.

2208. C. Edkins, Birmingham—Certain imp. in ladies' dress suspenders.

2209. J. E. Ridges, Wolverhampton, and J. Barker, Birmingham—Certain imp. in composite carriages for funeral and other purposes.

2210. D. Heyworth, Featherstall Mill, Littleborough, and J. Heyworth, Manchester—Certain imp. in looms for weaving.

2211. P. Effertz, Manchester—Imp. in machinery or apparatus for making bricks, tiles, drain pipes, and other similar articles.

2213. F. Bennett, Upper Works, Bagillt, Flintshire—An improved method of coating the interior surface of lead and lead composition pipes with tin or its alloys.
2216. J. Napier, Glasgow—Imp. in the manufacture of armour plates for the protection of vessels of war, floating or other batteries.
2217. J. Napier, Glasgow—Imp. in apparatus for cooling the water employed for condensing steam or other purposes.
2218. J. Napier, Glasgow—Imp. in machinery for rolling iron or other metals.
2219. C. W. Harrison, Holland-grove, Brixton—Imp. in the construction of castors.
2220. T. Greenwood, Leeds—Imp. in machinery for sawing wood.
2221. J. Reid, Leith—Imp. in the treatment of gas, and the apparatus employed therein, with a view to its more accurate measurement in wet gas meters.

Dated 6th September, 1861.

2223. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Imp. in ribbon looms. (A com.)
2225. W. Spence, 50, Chancery-lane—Imp. in apparatus for dividing and softening vegetable fibres. (A com.)
2229. C. F. Kirkman, Palace New-road, Lambeth—Imp. in obtaining manure from sewerage, and in the apparatus employed therein.
2235. T. G. Messenger, High-street, Loughborough—Imp. in glazing horticultural buildings, the roofs of railway stations, and other erections.

Dated 7th September, 1861.

2243. R. O. White, Blackheath-park, Surrey—Imp. in the manufacture of bricks.

Dated 9th September, 1861.

2245. G. Malcolm, Dundee—Imp. in machinery or apparatus for softening or treating jute, hemp, flax, or other similar fibrous substances.
2247. W. Dowell and J. Dowell, Rhyl, Flintshire—A new or improved motive-power engine.
2249. A. Frier, St. Anne's Retreat, Sutton, Lancashire—Imp. in propellers and in propelling vessels through water.
2251. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in machinery or apparatus for making cigars. (A com.)
2253. R. A. Brooman, 166, Fleet-street—An improved method of producing mixed coloured woollen and other threads. (A com.)

Dated 10th September, 1861.

2255. J. Anthony, 10, Oxford-terrace, Poplar—Imp. in steam boilers and generators.
2257. J. Smith, Sadlers-place, London-wall—Imp. in sewing machines.

Dated 11th September, 1861.

2259. R. Restell, Croydon, Surrey—Imp. in the means of connecting and disconnecting engines and tenders to and from trains.
2261. J. Bowns, Earlstown, Lancashire—Imp. in railway wheels and railway breaks.

INVENTION WITH COMPLETE SPECIFICATION FILED.

2268. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—An improved combination of chemical and mechanical processes for the conversion of fibrous vegetable matters into paper pulp. (A com.)—12th September, 1861.

PATENTS SEALED.

[*From Gazette, September 20th*, 1861.]

September 19th.

696. J. Ridley.
701. N. Lloyd and J. G. Dale.
709. G. Baxter.
713. A. Heaven and R. Smith.
716. W. M. Cranston.
724. E. Humphrys.
725. T. Thomas.
728. C. E. Swindell, J. Russell, and J. Price.
729. A. Haley.
736. J. Billing.
737. J. Spencer.
738. T. Cardwell & D. Campbell.
739. H. Wickens.
741. P. R. Hodge.
742. J. T. Holden.
744. J. Grant.
745. J. Brown and R. Gregson.
748. J. Morgan, A. T. Jay, E. Edwards, and J. Tilston.
749. W. Brookes.
753. J. Chatterton & W. Smith.
759. T. Davison & R. Paterson.
768. J. M. Dunlop.
773. P. M. Parsons.
784. J. Rattray.
788. W. D. Napier.
789. J. J. L. Guiblet and J. Rambal.
790. D. Sutton.
798. G. Edmondson.
807. W. Brookes.
817. W. Clark.
834. M. Benson.
853. T. G. Ghislin.
875. W. E. Newton.
910. A. F. Delaunoy.
935. R. Hodgson and E. Holden.
1154. J. H. Johnson.
1445. H. De Simencourt and J. K. Blackwell.
1702. W. E. Newton.
1798. J. Mason.
1802. A. V. Newton.
1813. J. A. Jaques and J. A. Fanshawe.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, September 20th*, 1861.]

September 17th.

2149. W. Richards.
2306. G. T. Bousfield.

[*From Gazette, September 24th*, 1861.]

September 20th.

2124. A. M. Perkins.
2130. R. A. Brooman.
2137. A. F. Jaloureau.
2150. G. L. Fuller.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, September 20th*, 1861.]

September 17th.

2017. S. Crabtree.
2143. G. Collier.

September 18th.

2021. J. Cunningham.
2060. R. McConnel.

[*From Gazette, September 24th*, 1861.]

September 20th.

2041. W. Hodson.
2114. J. Penn.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietor's Name.	Address.
4387	July 19.	Washing Machine	William Whitley	6, Queen's-road, Bayswater, W.
4388	,, 22.	Valve for Gas Furnaces	Giden Blake	6, St. George's-terrace, Trowbridge, Wiltshire.
4389	,, 27.	A Combined Food Preparer	James Barry	Newton Abbott, Devon.
4390	Aug. 1.	A Combined Spittoon and Footstool	Charles W. Heckethon	8, St. Ann's-road, Brixton, S.
4391	,, 1.	The Blanch Combined Muzzle Stopper Oil Bottle, Nipple Pricker, and Rifle groove Protector	Wm. H. Blanch	Liverpool.
4392	,, 5.	The Ventilated College Cap	Joseph Hardwick	429, High-street, Cheltenham.
4393	,, 7.	Lynch-pin, specially adapted for Gun Carriages	George Hazeldine	5, Lant-street, Borough, S.
4394	,, 7.	Portable Music and Reading Stand	Wm. Harrison Barwell	Northampton.
4395	,, 7.	Combined Rifle Muzzle Stopper and Sight Protector	James Kerr	Henry-street, Bermondsey, S.
4396	,, 12.	Portable Photographic Operating Chamber	Wm. White Rouch	180, Strand, W.C.
4397	,, 13.	Weighing Machine	Day and Millward	Birmingham.
4398	,, 14.	A Malt Shovel	Faviell and Burrell	Leeds.
4399	,, 14.	A Page and Dress holder	George Speight	5, St. John's-street-road, Clerkenwell.
4400	,, 16.	A Glue Pot	Griffith and Browett	Birmingham.
4401	,, 22.	Lock Spanner	Drury, Bros. and Walker	Don Iron Works, Sheffield.
4402	,, 24.	Agricultural Drill	James Nason	Stratford-on-Avon.
4403	,, 26.	The Blanch Combined Rifle Sight-Protector, Object Tube, Nipple Key, and Turn Screw	Wm. H. Blanch	Liverpool.
4404	,, 26.	An Improved Stamp Guide Bar	Isaac Marshall	Nottingham.
4405	,, 28.	A Register Holder for Rifle Practice and other purposes	Isaac W. Petty	Manchester.
4406	Sept. 7.	The Imperial Toilet and Travelling Bag	C. A. Orth and Sons	15, Chiswell-street, E.C.
4407	,, 10.	Dispatch Box	Parkins and Gotto	24 and 25, Oxford-street, W.
4408	,, 20.	Watch Cap and Fastener	T. G. Forneaux	Coventry.
4409	,, 25.	A Copying-press Water Well	Goodhall and Dimsdale	9, Pancras-lane, City, E.C.

Journal of the Society of Arts.

FRIDAY, OCTOBER 4, 1861.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £431,700, have been attached to the Deed.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

It will be interesting, probably, to the Members of the Society to have a short notice weekly of the progress of the building and the general arrangements for the Exhibition, and it is intended to furnish one, bringing up the facts to every Wednesday morning.

Five months ago the area at the southern extremity of the Horticultural Gardens was an open field; already the enormous space of about 22 acres, is more or less covered. The chaotic masses of timber and iron which periodically litter the ground rapidly melt away, while column rising on column, and joist upon joist, tell the tale of their consumption. A sufficient portion of the building is completed to realize fully the general plan as well as the proportions.

The pillars of the nave with the adjoining galleries are raised throughout its entire length, and at the eastern end seven ribs of the roof and seven windows of the clerestory are erected; three ribs of the roof are fixed on the eastern transept. The galleries also are being pushed forward, and mark the position of the glass courts. The southern picture gallery is completed to the roof line, and fourteen principals of the roof are fixed, being half the whole required.

Perhaps the most novel and interesting portion of the works at present consists of scaffolding. That intended for the erection of the eastern dome is finished to the height of 180 feet, and is probably the largest timber scaffold ever erected in this country. It consists of about 30,000 cubic feet of timber piled up in eight stories. The corresponding scaffold at the other end of the nave is nearly half done.

In order to raise the ribs of the nave, a travelling scaffold has been erected, to move on a tram throughout its entire length. This beautiful piece of workmanship is about 95 feet high, and has cost the contractors the sum of £500 at least. Notwithstanding its size and weight, it can be run along the tram by four men. To prevent the tramway from being driven into the earth by the superincumbent structure, it has been found necessary to drive piles for it to rest on.

The Machinery Shed, in Prince Albert's-road, is in a very forward state. It consists of four aisles, lighted from the top, and presents a noble picture of elegance and lightness, with rather a Gothic look given by the intersection of the circular ribs. The cheapness of the cost of its production is a no less remarkable feature of its construction, and offers a useful suggestion for any temporary buildings, or for those intended for agricultural purposes.

In the meantime, the arrangements for the Exhibition itself are progressing quickly and favourably.

The 30th of September was the last day on which applications for space were received. The total number of applicants from Great Britain and Ireland amounts, speaking roughly, to 10,000, and, as might be expected, a very large number of these have only come forward at the last moment. On Friday, the 27th, 200 applications came in; on Saturday, 300; on Monday, 500; and on Tuesday, the last day, nearly 600.

Foreign countries are expected to notify to H.M.'s Commissioners the manner in which they will utilize the space allotted to them, on or before the 1st of November, soon after which period the position of the different countries in the building will be fixed. As at present proposed, the machinery of all countries will be exhibited together. So also Photography and Education will form international exhibitions.

Some amount of dissatisfaction has been expressed by all the large countries on the Continent at the smallness of the space placed at their disposal, and they point to the much larger space which they occupied in Paris in 1855, as a claim for an increase on that allotted to them on this occasion. It should be remembered, however, that H.M.'s Commissioners are unable to accept the Paris Exhibition as a precedent; practically the extent of ground at the command of the French Commissioners in 1855, as well as the funds provided by an Imperial Government, were unlimited; the area occupied by H.M.'s Commissioners in 1862 is not susceptible of extension, and the capital is the result of the private liberality of a thousand guarantors animated only by public spirit. Speaking generally, and considering the space to be reserved for ceremonials and passages, the whole space available for the actual exhibition of works of industry will be scarcely, if at all, larger than that occupied in 1851.

The following arrangements have been made since the last announcement:—

East Indies.

The Government of India have authorised the expen-

diture of one lac of rupees in furtherance of the Exhibition. This sum will be administered by the local committees appointed at the seat of Government of each of the provinces of India, who are actively engaged in carrying out the various measures that will be necessary to secure an efficient representation of the industrial resources of Her Majesty's Eastern empire.

United States of America.

H.M. Commissioners for the Exhibition of 1862 have received a communication stating that a Commission has been appointed to represent the interests of exhibitors from the United States of America in the coming Exhibition, consisting of the Hon. William H. Seward, Secretary of State, the Hon. Edward Everett, and several other distinguished gentlemen.

Commissions have also been appointed at the under-mentioned Colonies:—

Barbadoes.

Stephen Cave, Esq., M.P., 62, Threadneedle-street, London, Commissioner.

Bermuda.

His Excellency the Lieut.-Governor, *President.*
Henry Frederick Plow, Esq., Honorary Secretary.

Nova Scotia.

The Hon. Joseph Howe, *Chairman.*
R. G. Halliburton, Esq., Secretary.

Prince Edward's Island.

H. Haszard, Esq., Charlotte-town, Secretary.

The Paris correspondent of the *Times* states:—"The Imperial Commission for preparing the French part of the Universal Exhibition at London has just issued another circular, in which it announces that it cannot attend to any applications for permission to exhibit which have reached it since the 15th of this month, except, however, for grave reasons of general interest, such as a new discovery, or the making up of a deficiency in any part of the French Exhibition. The rest of the document is taken up with a description of the Exhibition Palace now in course of construction in London. The Commission states that the total surface presented by the building and its annexes will be 108,203 square mètres, of which 82,195 in the building, and 15,684 in the annexes, are set apart for manufactured productions, 7,210 in the building for fine arts, and 3,114 also in the building for buffets. At Paris, in 1855, the total surface was 168,202 square metres—manufactures occupying 56,007 in the Palace, and 74,389 in the annexes, fine arts 16,150 in the annexes, the rest being set apart for buffets."

THE BRITISH COLONIES AND THE INTERNATIONAL EXHIBITION.

By P. L. Simmonds.

No. V.—The Australian Colonies.

I endeavoured to show in the last number of the *Journal*, by carefully prepared tables and figures derived from official documents, the remarkable progress which the Australian colonies have made in the last ten years; and the altered relation in which they will stand before the British and European public next year, to what they held in 1851. These figures, and the deductions drawn from them, could not fail to surprise many who had formed but a vague notion of the agricultural and commercial progress and material wealth of our great Australian Empire—an aggregation of important States, rivalling in progress the advance of either the African, West Indian, or North American groups of colonies.

That the Australian colonies in general will be creditably represented here next year, there an be no doubt whatever, judging from the notes of preparation, the systematic manner in which the colonial arrangements are being carried out, and the active exertions that are making in all quarters. Victoria, Tasmania, New South Wales, Queensland, and Western Australia have all received liberal colonial grants for carrying out the object. South Australia, on the contrary, has elected to depend solely upon individual contributions. The sums voted by the several legislatures, in the aggregate exceeding £20,000, aided by private liberality and individual effort, will go far to make up a most creditable display, and the Australian courts at South Kensington bid fair to be among the most attractive of the colonial displays in the great building.

There are many points in which the Australian colonies are sure to be well represented. The main staples of wool, building woods, minerals, and even wines from some localities, will be certain to receive due attention; but I trust to see secondary articles also sent forward, for some of these are very likely to become of commercial importance hereafter. There are many ornamental woods, for instance, admirably suited for cabinet work, which only require to be seen and examined to be duly appreciated.

The earth is now being ransacked for new fibrous substances for making paper, millboard, cordage, &c., for which purposes some of the barks of Australian trees, and the fibrous materials of many of the native plants are, perhaps, well calculated. The extension of the manufacture of papier maché has created a great demand for all iridiscent shells, and many of those common on the Australian shores might possibly, if exhibited, be found suitable for this or some other profitable use. The fashion of wearing ornamental feathers may possibly also bring into use those of many of the beautiful land and aquatic birds of Australia and Tasmania, which are scarcely known at present in England. The skins of the fur-bearing animals may be exhibited with the greatest advantage.

Examples of the alpacas and mohairs of Australian growth, and manufactures therefrom will be sent. Silk, too, is an industrial product in which we should like to see some progress made. Many tropical fruits and plants have been successfully introduced into Australia, and these should be shown either by wax models, in spirits, or in some other form, in order to convey a correct idea of the range of climate and producing capabilities of the country.

Investigations seem hitherto not to have pointed out any important dye-plants indigenous to Australia, although it may be presumed that some of the various colonial woods and herbs may yield such. The wattle bark is employed locally in all the tanneries, and, previous to the Australian gold era, formed an article of export to the English market. The gum resin of the *Eucalypti* is also employed for tanning. For investigations into the medicinal properties of plants in Australia a wide field is still open. More attention should be directed to the circumstance, that all the myrtaceous plants, which, throughout Australia, constitute the main part of the timber, and generally also of the scrub vegetation, yield, in a greater or smaller degree, an essential oil. Unlimited quantities of *Eucalyptus* and *Melaleuca* leaves might be turned to account by the simple process by which, in India, the cajeput oil is obtained.

Paintings, photographs, and views of the scenery, buildings, &c., of the colonies should especially be sent, as these have a particular attraction for intending emigrants and those who have friends settled there, and will convey a truthful picture of the actual condition of the colony.

The literature of Australia should also be duly and creditably represented, and this branch of progress will compare satisfactorily with that of any of the British colonies, either as regards periodical literature, newspapers, magazines, and almanacks, or even works of colonial origin printed in the mother country. The newspaper literature of Australia and New Zealand will compete creditably, whether as regards typography or subject matter, with that of any other British dependency, and is, indeed, far in advance of that of British North America,

the West Indies, or South Africa. A collection of specimens of the existing newspapers will also prove of great interest both now and hereafter. I may state, indeed, without fear of contradiction, that the art of printing has been carried to a perfection in many of the Australian colonies that will bear comparison with the finest work emanating from the London press.

The Australian Colonies generally are likely to be so well and fully represented, that it is impossible to do justice to the industry and diligence of all in a mere abstract in one *Journal*. I must, therefore, take them *seriatim*, commencing with the oldest.

New South Wales.

His Excellency the Administrator of the Government, with the advice of the Executive Council, has appointed a Commission, consisting of the undermentioned gentlemen, to advise and carry out the details necessary to facilitate the transmission to London of articles the produce or manufacture of New South Wales, and adequately representing the resources of the colony.

The Hon. T. A. Murray, Speaker of the Legislative Assembly; Sir Chas. Nicholson, Bart.; Sir Wm. Macarthur, Kt.; the Hon. R. J. Want, Member of the Legislative Council; A. W. Scott, Member of the Assembly; Capt. E. W. Ward, R.E., Deputy-Master of the Royal Mint; the Rev. W. B. Clarke, M.A.; John Campbell, Chas. Kemp, and Thos. S. Mort, Esqrs.

A sum of £3,000 has been voted by the legislature, and placed at the disposal of the Commission; and a further sum of £5,000 for the purchase of gold specimens, to be repaid after the sale of the gold. The Commission charges itself with defraying the cost of articles intended for exhibition, to Sydney and all subsequent expenses connected with storage; the conveyance to London; the repacking and reconveyance (if desired) of the respective objects back to the Colony. The specimens to be selected, it is pointed out, without being too bulky, should be of the choicest character and as varied as possible, and they are to be more particularly illustrative of objects, the sources of present wealth and prosperity, or of indigenous products which there is a reasonable presumption may hereafter prove to be of economic value or of commercial importance.

The Commissioners have published and circulated, for general information, their scheme for carrying out the intentions of the Government. They have also formed themselves into committees for the better execution of their design. It is proposed to recognise meritorious contributions and those who may actively co-operate with the Commissioners, by the local presentation, as prizes, of silver and bronze medals.

The animal products intended to be sent are wool, silk, feathers, skins, horns, hair, preserved meats, cheese, tallow, animal oils, manures, whalebone, tortoiseshell, pearls, corals, and other articles. It is contemplated sending wool in very diminutive bales, and exhibiting whole fleeces so far as possible.

Messrs. T. S. Mort and Co., of Sydney, have invited the wool growers of the colony to send in samples of the present year's clip, to compete for three gold medals, and afterwards to be forwarded, through the Colonial Commissioners, to the International Exhibition. The same firm has notified its intention to offer two gold medals for the first and second best samples of cotton, the produce of New South Wales. Local prizes are offered by the Government for the best six fleeces of wool in the grease, for the best six washed on the sheep's back, and for the best samples of scoured sheep's wool (12 lbs.) Letters have been addressed to several gentlemen calling on them to contribute skins of the sugar squirrel, wallaby, platypus, grebe, and lyre bird.

But one of the principal, if not the most interesting, of the New South Wales exhibits will be a collection of stuffed skins, showing the various successful crosses of that valuable animal, the alpaca. The necessary authority having been given by the Government, Mr. C. Ledger purposes killing nine animals, from the increase of the flock since their arrival in the colony, the skins of which are to be carefully stuffed and set up, in order to show the quality of the fleece, and also the results which have accrued from systematic and judicious crossing or in breeding. The tallow or lard taken from the animals (and which, we believe, has valuable medicinal properties) is also to be forwarded in glass jars for the inspection of those who may feel interested in the matter, while an opinion on the quality and nutritious properties of the flesh is to be elicited by means of a distribution of venison to the different clubs of Sydney, and to such private individuals as may be desirous of giving a qualified opinion on the point. In his letter to the Commissioners, wherein he suggests the propriety of such an exhibition, after alluding to the comparatively small cost which it would entail, Mr. Ledger says:—"This would in all probability be covered by the sale of the specimens in London. I entertain no doubt but that they would command a high price, not only from the fact of their being the indication of a new source of valuable export from this colony, but for demonstrating the fallacy of hitherto erroneously advanced theory as to the sterility of the cross breedings of this animal. Hybridization assumes through them a complete change. The 'savans' will see that they have been in error for a very long period; and, moreover, the collection will be the first ever exhibited of the 'Auchenia' in its varied crosses, and will be worthy a place in the National Museum."

As a new and prospectively important source of productive wealth, the alpaca enterprise in the International Exhibition will be a great attraction. The specimens will show the several crosses, six in number, each successive cross losing the characteristics of the llama, and approaching the pure alpaca so closely, that in the last stage the fleece can only by practised eyes be distinguished from that of the pure alpaca. Only one animal representing the latter class will be slaughtered; the other animals would not be serviceable for breeding, so that the loss of the animals will not be felt. It is suggested that the specimens should, at the Exhibition, be grouped in a circle, commencing with the male alpaca and the female llama, exhibiting the gradual improvement of the fleece, the sixth cross being a scarcely perceptible remove from the pure alpaca. The specimens will prove the success that has attended both the acclimatisation of the alpaca in Australia, and also the cross breeding which Mr. Ledger has been conducting. The group will, no doubt, form an object of great interest in the New South Wales Department of the Exhibition, especially to those who are alive to the value of the alpaca fleece for manufacturing purposes.

Mr. Ledger has recently received intimation of a first-class gold medal having been awarded by the Société Imperiale Zoologique d'Acclimatation de Paris, as a testimonial of his services as a "universal benefactor" in the introduction of alpacas into Australia.

The vegetable products that will be sent from New South Wales are wheat and other cereals, seeds and pulses, coffee, cotton, tobacco, hops, dried and preserved fruits, pickles, arrowroot, starch, sugar, ginger, gums and resins, vegetable oils, fixed and volatile, medicinal substances, woods, barks, dye stuffs, tanning substances, and vegetable fibre, suitable for cordage or paper. The woods are to be represented, first, by pieces about 5 feet long by 2½ inches square in section, for testing, if desired; secondly, by blocks of 9 inches, or one foot cube of wood fit for cabinet work, and thirdly, by the largest timber obtainable from trees of known value for timber. Eighty-seven specimens of the woods of this colony and Queensland have recently been tested at the Sydney Mint, with a view to the determination of their relative degrees of strength and elasticity. Many of them prove to be superior in both respects to the oak, the ash, and the best woods of Great Britain. An extensive forest of the very best cedar has recently been discovered on the Clarence river.

Mr. Moore, the Director of the Sydney Botanic Gardens,

has been collecting woods and other botanic specimens in the Clarence and Richmond River District.

The Mineral Products Committee have solicited contributions from several quarters, among others from the following companies and individuals:—The Sumner-hill Mine, the Ophir and Canabolas Mine, the Carangara Mine, the Coal and Copper Co.'s Mine, requesting them to furnish specimens of all the different ores found in those mines, and of the rocks most prevalent, with, if possible, plans and sections showing the working of each mine;—to Mr. Arthur Hodgson, General Superintendent of the Australian Agricultural Co.'s Coal Mines, to Mr. Mooar, Commissioner of Crown Lands at Tamworth (asking him to forward marble and limestone), and to others.

The Committee have also communicated with the Commissioners of the Gold Fields, requesting them to furnish a sample of not less than six ounces in weight from each alluvial gold field in the district under their charge. There are about fifty gold fields in New South Wales, and it is reported that while the gold fields of Victoria are declining in the yield, those of New South Wales are steadily increasing. These samples are to be obtained by some trustworthy person on the spot, from diggers actually at work, so as to leave no question that it is in its entirety the produce of that particular field. With each sample is also to be forwarded a small quantity, say a quart, of the "washing stuff," stating its average yield and thickness. A specimen of each kind of deposit overlying the washing stuff, with a statement of the thickness of each, and of the order in which it occurs, and a specimen of the bed rock. Specimens of auriferous quartz from reefs which are being worked, or which are considered capable of being worked with profit; accompanied in the former case by a statement of the machinery employed, the work performed, and the average yield per ton.

The gold seekers in New South Wales are now working on the quartz veins, and breaking up the quartz, which under the process of stamping, pays, if it only gives two or three ounces to the ton; and looking at the enormous amount of tons of quartz which lie easily exposed to the sun, many years must elapse before it will be exhausted. The Rev. Mr. Clarke predicted, and proved in 1854, that there must be an extensive gold field in the Snowy Mountains, but the geographical situation is such that digging becomes difficult in those ranges. This he considers to be the matrix of all the gold fields south and west. For a considerable portion of the year this range is covered with snow, but in the fine winters that succeed the summers, more gold is sent down from those regions by those who are hardy enough to venture there, than from all the other parts of the colony.

The Committee have also addressed the owners of coal mines, requesting them to furnish samples of not less than half a ton of coal, from each coal seam under their direction, either being worked or capable of being so with profit; informing them that these will be sent to England, first for display, and afterwards for the experimental determination of their commercial value. The whole of these samples to be supplied under the supervision of the Government Examiner of Coal Fields.

Another class of objects intended to be sent are those illustrative of the progress of arts and manufactures, such as soap, candles, and stearine, glue, refined loaf sugar, molasses, sulphuric acid, colonial tweeds, flannel, and other textile fabrics, cabinet work, leather, pottery, works in metals, beer and brandy, pictures and drawings, and objects of natural history.

It is intended to exhibit implements and parts of machinery manufactured of colonial iron and steel; the cabinet woods and workmanship of the colony in an ornamental door, and the state of the art of photography by photographs of the principal buildings. Two or three water-colour drawings by the best artists will be also added to the collection.

In the department of manufactures there will be included specimens of tobacco, wine, silk, jewellery, cutlery, models, cordials, manufactured skins and leather, pipes, furniture and marble-work, &c. The two departments of raw products and curiosities will include a goodly collection of specimens. I may notice a few of the more interesting articles and exhibits which have already been entrusted to the care of the Commissioners.

The superiority of the colonial timber for purposes of ship-building is shown by a small block of blue gum from the framework of the steamer *William the Fourth*, built by Messrs. Marshall and Lowe, on the Clyde River, in the year 1830. The wood is as hard and as sound as the day it was felled, notwithstanding that it has undergone the wear and tear and exposure of thirty-one years. This small and unpretending item will, no doubt, be viewed with much interest by the shipwrights of the mother country, and also by many old colonists who have travelled at one time or the other in the steamer from which it is taken.

Mr. Scott, of Carrington, near Port Stephens, sends a rare and valuable specimen of the stilted plover, a bird now rarely to be met with. It is in fine condition, and when set up will be an object of interest to all professional and amateur ornithologists.

A native cat-skin rug is contributed by Mr. David Jones, of George-street. This is chiefly noticeable as a specimen of what might be done in the way of a fur trade. The skins are beautifully marked, and have all the glossy softness of the chinchilla.

Mr. Peck, of Sommernil, forwards, with other articles, a block of steatite (soap-stone); while several fine samples of our colonial white and coloured building stone are contributed by Mr. Blackett, the well-known architect. Some blocks of native meerschaum from the recently-discovered quarries in the Clarence River district will also be sent home, together with some smoking pipes manufactured in the colony from the same commodity.

Mr. Ferris, of Sydney, sends some superb specimens of carving in wood. One piece, representing "Cupid bound," is executed in a most elaborate and artistic manner. Four picture-frames, in antique scrollwork, affords further evidence of Mr. Ferris's great skill, taste, and industry in this particular branch of human labour.

A door-bracket, exhibited by Mr. Oram, will serve to show both the beauty of the cedar and the carver's skill in following that heavy Italian scroll-pattern which is so popular at the present time. Numerous articles of furniture from colonial wood will be forwarded by Messrs. Hill and Sons, and also by Mr. Lanehan, of Castlereagh-street.

Among the cereals are some cases of maize in cob, contributed by Mr. Underwood. These will compare favourably with any specimens that may be forthcoming from any other portion of the world, and will prove that, despite any drawbacks, the agricultural capabilities of New South Wales are not wholly overlooked.

A sword, manufactured, the blade by Mr. Jennings, and the hilt by Mr. Julius Hogarth, will also merit special notice. The weapon will combine two great natural products of the towns, and at the same time show that the artists and handicraftsmen are not at all behind their fellow-subjects in England or the workmen of the Continent.

Colonial wines will form not the least important item in the New South Wales department of the Exhibition. Among the list of contributors are the following:—Capt. Russell, Mr. Lindeman, Mr. Blake, Mr. Bettington, Mr. Lawson, and Mr. Sanger (of Albury.

The Commissioners for the Colony intended to receive exhibits up to the 18th September, after which date they proposed holding a Local Exhibition of the selected articles in Sydney. This would extend over a month or six weeks, and the whole was then to be sent on to London in January, under the care of competent persons appointed to arrange for their reception and display in London. Mr. Sedgwick S. Cowper is Secretary to the Local Board, and Edward Hamilton, Commissioner in London for the Colony.

BRITISH ASSOCIATION, 1861.

The following Paper was read before the Mechanical Section:—

Upon the Merits of the "Beam" Steam Engine as compared with the "Direct-Action" arrangements, as a motive power for driving machinery used in various manufacturing purposes. By W. B. Johnson.

The importance of ascertaining, as far as our present progress in mechanical engineering will allow, the best arrangement of stationary engine upon the reciprocating principle, will be apparent to all that have given the subject consideration. But two views are of great weight at the present time; one is the increasing demand that is being made upon motive power for driving machinery made to take the place of manual labour. The unsettled condition and increasing value of labour in this country make it almost imperative that manufactures in every department should be produced with as little dependence as possible upon labour. This is a movement that will eventually call forth a large amount of motive power, and a motive power differing considerably in its arrangement from that now generally adopted. The other view of the subject is of equal importance. If motive power is to be supplied at anything like a moderate cost, as compared with other classes of machinery, it must assume something of a fixed form, and to such a degree as will induce the maker to apply machinery in its manufacture to a much greater extent than has hitherto been done. This would not only lessen the cost considerably, but at the same time improve the quality of the work. It is now generally admitted that machinery produced by the application of tools is in all respects much superior to that produced by hand labour. It may safely be asserted that in no class of machinery is less advantage taken of the assistance of tools than in the production of stationary steam engines. Other reasons might be mentioned for giving the subject of this paper careful consideration. The general consent of engineers to the superiority of steam as a motive power over all other agents, and the universal adoption of the reciprocating piston as the best mode of receiving power from the same, are also ample reasons why an attempt should be made to ascertain the best arrangement for applying such motive power to manufacturing purposes.

Locomotive and marine engineers have, within a comparatively few years, made considerable progress in arriving at the most suitable arrangements of the parts composing such engines; but the stationary engine has remained almost in the same condition in which it came out of the hands of its first originators. Locomotive and marine engineers have abandoned the notion that a "beam" is a necessary part of an engine, but that in some mysterious manner an advantage is obtained by conveying the motive power through a beam, appears still to be the opinion of most engineers engaged in the manufacture of stationary engines.

The stationary beam engine, as ordinarily constructed, is one of the most imperfect pieces of mechanism produced in this country; its parts, taken in detail, are frequently specimens of most excellent workmanship, and exhibit considerable skill in the design, but, when considered as a whole, the machine is dislocated, its parts are numerous, far removed from each other, and in many places it depends upon extraneous support for giving it unity and strength. The foundation work and engine-house walls form the greater part of the framework of the engine, and the engine is thereby subjected to casualities which are quite at variance with one's conception of a perfect machine. Its forces are in various directions, the first mover, the piston, moving apparently without reference to its ultimate purpose, the rotation of the crank-shaft; it starts off, at some distance, at right angles with the shaft. As if afraid at once to face its work, it seems to court a circuitous route in preference to a direct one.

The object of this paper is to bring into comparison with the ordinary beam engine the direct-action engine, and to show the superiority of the latter over the former, and also to compare the various arrangements of direct-action engines with each other; and, before proceeding further, it may be proper to state, that the term, "direct action" engine, used in this paper, refers to that particular construction in which the power is conveyed from the piston rod to the crank by the intervention of a connecting rod only. The remarks to be made have special reference to condensing engines; preference has been given for some time to direct-action over the beam, for non-condensing engines, the less number of parts in a non-condensing engine making the application of the direct-action principle a simple undertaking.

The principal objections that have been made to the beam engine are:—

1st.—The large amount of foundation work required.

2nd.—The side walls of the engine-house are required to be built of a strength considerably beyond what is required for a direct-action engine.

3rd.—The height required is in most cases objectionable, interfering with the lights in the rooms next to the engine-house.

4th.—The number of parts through which the power is conveyed, and consequent liability to derangement.

5th.—The serious results of any breakage, the parts in falling, in almost every instance of breakdown, doing considerable if not all the mischief.

6th.—The difficulty of observation of and access to the condensing apparatus of the engine.

7th.—The entire dependence of the engine upon the foundation and engine-house walls for unity and support, any settlement in the same causing serious difficulty in readjusting the parts of the engine affected thereby.

These objections are named to enable a comparison to be made with the direct-action arrangements, and to ascertain how far such objections are removed by this principle of construction. Direct-action engines are of two kinds, vertical and horizontal. In the vertical, the reciprocating movement of the piston is in a vertical line with the crank shaft placed either above or below the cylinder. In the horizontal, the movement of the piston is in a horizontal direction; the position of the crank shaft being constant, does not admit of the distinction just named in the vertical.

The vertical arrangement of direct-action engine requires:—

1st.—Considerably less foundation work than the beam engine.

2nd.—The walls of the engine-house may be built independent of the engine, although in some constructions of this engine the walls are fully as much depended upon as in the beam engine; this is decidedly objectionable.

3rd.—The height required is equal to that of the beam engine, and it possesses no advantage over the beam engine in this respect, except that the length of the engine-house is less by about one half.

4th.—The number of parts through which the power is conveyed are equal in proportion as 2 is to 5.

5th.—The results arising from breakdowns are less severe than in the beam engine, although from its construction it is not free from objection on this ground.

6th.—The ease of access to the condensing apparatus will greatly depend upon the arrangement adopted in this part of the engine, but the principle admits of a better one than could be applied to the beam engine.

7th.—It is independent of the foundation work and engine walls for unity, "except in instances of imperfect construction;" its forces are self-contained, and it does not therefore suffer from settlement or changes in the building in which it is placed to the like extent as the beam engine.

The vertical direct-action engine has the advantage over the beam engine in the 1st, 2nd, 4th, and 7th points named, and also a slight advantage in the 3rd and 5th points; in reference to the 6th point, "the condensing apparatus," its advantage over the beam engine will en-

tirely depend upon the arrangement adopted for working the air-pump and the relation of its parts.

When the crank shaft is above the cylinder, these parts may be conveniently arranged so as to be easy of access and observation, and at the same time be within a suitable distance from the cylinder; but when the crank shaft is below the cylinder, the condenser is far removed from the cylinder, which is an objection to this description of vertical direct-action engine. From this it appears that the best arrangement of vertical direct-action engine is the one having the crank shaft above the cylinder. A very excellent engine can be made by having the cylinder, condenser, air-pump, and framework well secured to one strong foundation plate; such an engine would be compact, yet easy of access to all its parts, and would possess that unity which is absolutely necessary for perfection in every class of machinery. Were it not that the particular position of the crank shaft is inapplicable in most cases where power is required, this construction of engine would merit the careful consideration of engineers to bring it up to a standard point of perfection.

The horizontal arrangement of direct-action engine, when compared with the beam engines, requires:—

1st.—Less foundation work, although this varies according to the different modes of working the air-pump.

2nd.—The engine is wholly independent of the engine-house walls, consequently they may be reduced to a minimum in strength.

3rd.—The height required is much less, being from one-third to one-half of that necessary for a beam engine.

4th.—The number of parts through which the power is conveyed are reduced in proportion as two is to five.

5th.—The results of break-downs are much less destructive, the whole of the working parts being within a limited distance from the floor, and therefore cannot cause any injury in falling.

6th.—The condensing apparatus, and all other parts of the engine, are easy of observation and access, except in some arrangements about to be referred to.

7th.—It is independent of the foundation work and engine-house walls for unity; its forces are self-contained, and it does not therefore suffer from settlement or changes in the building in which it is placed, to the same extent as the beam engine.

The horizontal direct-action engine has the decided advantage of the beam engine in the 1st, 2nd, 3rd, 4th, 5th, 6th and 7th points of comparison, and also has some advantages over the direct-action on the vertical arrangement. For general purposes the crank shaft is conveniently situated; the lines of movement and position of the working parts are also conveniently placed for observation and access; these considerations point to this arrangement of engine as the most suitable for general adoption, and it merits from engineers and those requiring motive power that consideration and attention necessary to place it in its proper position as the best arrangement of stationary steam engine.

Various modes have been adopted for working the air-pump in horizontal direct-action engines—the relative positions of the condensing apparatus is a question of the utmost importance in endeavouring to make this engine efficient in working, compact and united in its parts, and at the same time easy of access for examination. One arrangement for accomplishing this consists in working the air-pump from the crank-pin, by a supplementary crank and shaft, and in some cases levers actuated by the crank-pin are employed for this purpose; but either of these, or any other mode of working the air-pump from the crank-pin, are objectionable; the parts of the engine are necessarily separated from each other—there is a want of unity and compactness; the strains are in various directions; the foundation work is considerably extended; and the air-pump and condenser are so far below the engine-house floor as to be inconvenient for examination.

Another mode of working the air-pump is by levers attached by links to the piston-rod cross-bar or mounting, in some arrangements of which the fulcrum of the levers is fixed above the horizontal centre line of the engine, and in some below. This may in some respects be superior to the mode first named, but still objection can reasonably be made to the number of parts required, and consequent liability to derangement. The strains are in a variety of directions; it is not united and compact; it requires extra foundation, and is frequently difficult of access for examination.

Perhaps the most correct notion of working the air-pump is that of attaching the air-pump rod direct to the piston-rod, without the intervention of levers, links, or any moveable joints. One mode of effecting this is by placing the air pump a slight distance from the end of the cylinder farthest from the crank shaft, and attaching the air-pump rod to the piston-rod which works through the back cylinder cover. This arrangement adds considerably to the length of the engine, and to avoid this the connecting rod is frequently made much shorter than is desirable for easy working. Another mode of carrying this arrangement out is effected by placing the air-pump near to the end of the cylinder next to the crank, the piston rod being continued through the air-pump on to the piston-rod mounting; the air-pump is between the piston-rod mounting and the cylinder end. The same objection applies to this mode, in regard to length, as to the former one, and attempts are made to overcome the difficulty in the same objectionable manner, "shortening the connecting rod," and by cramping up the parts, so as to make them difficult of access. Another and third mode of working the air-pump direct from the piston-rod consists in placing the air-pump between the piston-rod mounting and crank, the space between the air-pump and cylinder being sufficient to allow for the working of the piston-rod mounting and guide blocks. The extra length of the engine is not so much as in the former arrangements, and what extra length is required is added to the length of the connecting rod.

The three constructions of engines just mentioned have in common considerable advantages over any other of the direct-action arrangements named in this paper. The foundation is a level bed, less in extent, without any breaks or depressions, and can therefore be more firmly bound together; the number of working parts are brought down to a minimum, not exceeding in joints and wearing surfaces beyond what is required for a non-condensing engine; the liability to derangement is consequently reduced in equal proportion. Every part of the engine is within the limits of easy examination, no part being under the engine-house floor, nor so far above it as to require any stage work, or second height of flooring. The strains are self-contained, and are all in one direction, and admit of a maximum unity and strength to be obtained with a minimum amount of material.

Other advantages peculiar to this arrangement—"working the air-pump direct"—might be mentioned, but sufficient has been said to show that it possesses claims which entitle it to the attention of all interested in the production and use of stationary steam-engines.

Engines have been made upon the various plans referred to, and they have shown in their comparative efficient working most clearly the truth of that almost universally admitted opinion in mechanical engineering—"that the success of a machine is in proportion to its simplicity"—of course, supposing correct principles to be adopted in the construction. Engines have been made upon the arrangement last mentioned, in which convenience of access is carried to an extent far beyond what would have been considered possible a few years ago; air-pump foot and delivering valves can be taken out and replaced; air-pump bucket packed, and cylinder-piston examined within one hour, and without the employment of extra labour beyond what is usual for such purposes. Facilities for examination is next in importance to the good working of an engine, and cannot be too carefully provided for—and in reference to special and economical working, this arrangement compares most favourably with all other constructions of engines hitherto adopted.

Great freedom has been taken with the beam engine in pointing out some of its defects—or which may fairly be considered objections to it—and it will now only be doing justice to subject the direct-action principle to the same ordeal. To the vertical direct-action arrangement no objections can be named beyond those already mentioned, but to the horizontal arrangement an objection was raised against it at its first introduction, and is still maintained by engineers of undoubted celebrity. The horizontal position of the cylinder is objected to on account of the piston in its movement wearing the lower more than the upper side of the cylinder; now, this is a question that can be best decided by a careful reference to the numerous examples of this kind of engine now at work; facts bearing upon this question can be obtained in almost any quantity, and it is desirable the task should be undertaken to ascertain how far this objection can be sustained. The horizontal principle in all probability will be extensively adopted for engines of a maximum size, and it would be well to ascertain, before proceeding too far in this direction, the true value of this objection. It has been found that, in all instances in which proper care has been taken, this objection is groundless, and cylinders upon the horizontal arrangement are wearing as equally as those placed vertically. It may be proper to remark that in horizontal engines too much care cannot be bestowed in endeavouring to make the piston and mounting and guide blocks as perfect as possible. The surfaces should be large, to prevent rapid wearing down, and the construction should be such as will admit of the piston-rod mounting being easily adjusted to its correct centre with the cylinder. With such arrangements, and the parts correctly made and put together, the evils implied in the objection just named are found in practice fully provided against.

No reference has been made to the various kinds of valve arrangements applied to the cylinders of engines, whether beam or direct-acting. The direct-action does not in this respect compare unfavourably with the beam engine; the horizontal arrangement perhaps has the advantage of any other in admitting valves of any construction to be applied in a simple and an efficient manner.

Reference has not been made to the other detail parts, the object of this paper being principally to deal with the broad question—Beam *versus* Direct-action, and on this point the distinctive features in all the arrangements considered, and those by which the type of the engine is chiefly affected, is, the position and mode of working the air-pump, and, therefore, almost exclusive attention has been given to them.

Before concluding it may be proper to draw attention to the manner in which most horizontal engines have hitherto been made. The ignorance displayed in many designs, and the imperfect character of the material and workmanship employed, have done much to bring the principle into disrepute; engines of bad construction have been put to a duty far above their capabilities. As a matter of course, they have given no satisfaction, but much trouble, and the principle at last bears the whole of the blame, when, in fact, it has nothing whatever to do with it. The horizontal engine is simple, but that is no reason why it should not be good in design, and of proper materials and workmanship; let the horizontal engine have skilful and careful attention in the design, be well executed, and put to its proper amount of duty, and it will not be long before it attains that position, as the best of engines, which by its beautiful simplicity it is so justly entitled.

EXAMINATION PAPERS, 1861.

(*Continued from page* 748.)

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in April and May last:—

LATIN AND ROMAN HISTORY.

THREE HOURS ALLOWED.

Section I.

Translate—

Stabat acuta silex, praecisis undique saxis
Speluncae dorso insurgens, altissima visu,
Dirarum nidis domus opportuna volucrum.
Hanc, ut prona jugo lævum incumbebat ad amnem,
Dexter in adversum nitens concussit, et imis
Avulsam solvit radicibus; inde repente
Impulit; impulsu quo maximus intonat aether,
Dissultant ripae refluitque exterritus amnis,
At specus et Caci detecta apparuit ingens
Regia, et umbrosæ penitus patuere cavernae.—Æn. viii.

1. Parse (giving both accidence and syntax,) saxis, dorso, insurgens, domus, nidis, jugo, radicibus, quo.
2. Conjugate the verbs to which belong stabat, præcisis, incumbebat, nitens, concussit, avulsam, impulsu, intonat, detecta, patuere.
3. Decline silex, domus, impulsu, aether, specus, ingens, cavernae.

Section II.

Translate—

Fecerat et viridi fetam Mavortis in antro
Procubuisse lupam: geminos huic ubera circum
Ludere pendentes pueros, et lambere matrem
Impavidos; illam tereti cervice reflexam
Mulcere alternos, et corpora fingere lingua
Nec procul hinc Romam et raptas sine more Sabinas
Consessu caveae, magnis Circensibus actis,
Addiderat, subitoque novum consurgere bellum
Romulidis Tatioque seni Curibusque severis.
Post idem, inter se posito certamine, reges
Armati Jovis ante aram paterasque tenentes
Stabant et caesa jungebant foedera porca.—Æn. viii.

1. Explain the historical allusions in this passage.
2. Parse (giving both accidence and syntax,) procubuisse, huic, cervice, linguâ, Circensibus, Romulidis, certamine, foedera.
3. Conjugate the verbs to which belong lambere, reflexam, mulcere, fingere, raptae, addiderat, posito, tenentes.
4. Decline, ubera, tereti, more, consessu, seni, reges, Jovis.

Section III.

Translate—

Moverat plebem oratio consulis; erecti patres restitutam credebant rem publicam. Consul alter, comes animosior quam auctor, suscepisse collegam priorem actiones tam graves facile passus, in peragendis consularis officii partem ad se vindicabat. Tum tribuni eludentes velut vana dicta persequi quaerendo, quonam modo exercitum educturi consules essent, quos dilectum habere nemo passurus sit? "nobis vero" inquit Quinctius, "nihil dilectu opus est, cum, quo tempore P. Valerius ad recipiundum Capitolium arma plebi dedit, omnes in verba juraverint conventuros se jussu consulis nec injussu abituros. Edicimus itaque, omnes, qui in verba jurastis, crastina die armati ad lacum Regillum adsitis." Cavillari tum tribuni et populum exsolvere religione velle: privatum eo tempore Quinctium fuisse, quum sacramento adacti sint.—Livi, iii., ch. 20.

1. Parse (giving accidence and syntax,) plebem, suscepisse, persequi, quos, dilectum, nobis, conventuros, armati, adsitis.
2. Conjugate the verbs to which belong moverat, credebant, passus, quærendo, recipiendum, abituros, edicimus, exsolvere, adacti.
3. Decline rempublicam, comes, rei, partem, exercitum, religione.
4. Mention the verbs in this passage that are in the subjunctive mood, and give in each case the reason why.

Section IV.

Translate—

Haec vociferante Horatio quum decemviri nec irae nec ignoscendi modum reperirent, nec quo evasura res esset cernerent, C. Claudi, qui patruus Appi decemviri erat, oratio fuit precibus quam jurgio similis, orantis per sui fratris parentisque ejus manes, ut civilis potius societatis, in qua natus esset, quam foederis nefarie icti cum collegis meminisset. Multo id magis se illius causa orare quam rei publicae: quippe rem publicam, si a volentibus nequeat, ab invitis jus expetituram. Sed ex magno certamine magnas excitari ferme iras; earum eventum se horrere. Cum aliud praeterquam de quo retulissent, decemviri dicere prohiberent, Claudium interpellandi verecundia fuit. Sententiam igitur peregit nullum placere senatus consultum fieri, omnesque ita accipiebant, privatos eos a Claudio judicatos, multique ex consularibus verbo adsensi sunt. Alia sententia, asperior in speciem, vim minorem aliquanto habuit, quae patricios coire ad prodendum interregem jubebat. Censendo enim, quoscumque magistratus esse qui senatum haberent, judicabant, quos privatos fecerat auctor nullius senatus consulti faciendi.—Livi, iii., ch. 40.

1. Parse (giving accidence and syntax,) irae, precibus, sui, societatis, expetituram, Claudium, verbo, magistratus, quos.

2. Conjugate the verbs to which belong ignoscendi, cernerent, meminisset, nequeat, retulissent, peregit, adsensi, coire, fecerat.

3. Decline oratio, precibus, foederis, eventum, speciem, vim, senatum.

Section V.

1. Give an account of the constitution of Servius Tullius.

2. What was the purpose of the Decemvirate?

3. Narrate the causes and the consequences of passing the Licinian laws.

4. Mention the steps by which the assembly of the Comitia Curiata was deprived of its powers.

5. What degree of citizenship could be conferred, according to Roman law, on foreigners.

Section VI.

1. Give an account of the great Latin War and its results.

2. Sketch the history and character of Hannibal.

3. Give a brief account of Coriolanus, Publilius Philo, Fabius Maximus, Appius Claudius the Blind, Cn. Flavius, Metellus.

4. What was the first war waged by Rome out of Europe? What caused it and what followed it?

5. What Roman writers lived before or during the time of Augustus, and what were their chief works?

FRENCH.

THREE HOURS ALLOWED.

Part I.

Candidates for a third-class Certificate are required to translate into English the following French fable, and to answer the grammatical questions thereto annexed (in the order in which they are placed). This first Part is all that will be expected of them.

Translate into English:—

La Vipère et la Sangsue.

La Vipère disait un jour à la Sangsue :
Que notre sort est différent!
On vous cherche, on me fuit ; si l'on peut, on me tue ;
Et vous, aussitôt qu'on vous prend,
Loin de craindre votre blessure,
L'homme vous donne de son sang
Une ample et bonne nourriture :
Cependant vous et moi faisons même piqûre.
La citoyenne de l'étang
Répond : Oh! que nenni, ma chère ;
La vôtre fait du mal, la mienne est salutaire,
Par moi plus d'un malade obtient sa guérison ;
Par vous tout homme sain trouve une mort cruelle.
Entre nous deux, je crois, la différence est belle :
Je suis remède, et vous poison.

Cette fable aisément s'explique :
C'est la satire et la critique.—Florian.

1. Add to each of the following nouns a suitable adjective, which will show its gender:—*Atmosphère, écritoire, incendie, parapluie, passage, précipice, intervalle, espace, armistice, sentinelle.*

2. Write the plural of the words, *Bijou, clou, travail, attirail, œil, ciel—égal, impartial, fatal—votre, le mien, le vôtre.*

3. Write the feminine of the adjectives, *blanc, Grec, Turc, frais, favori, sec, fou, malin, vengeur, vieux, bénin, faux.*

4. When are the adjectives *beau, mou, vieux,* changed into *bel, mol, vieil,* and what is the object of the change? Name other adjectives that are affected by the same rule.

5. What is the rule as to the agreement of an adjective that relates to several substantives of different genders, in sentences like this—His father and mother are aged?

6. Explain the peculiar rule concerning the agreement of adjectives that qualify the substantive *gens,* taking as an example this sentence:—Old people are sometimes suspicious.

7. The following substantives have two genders:—*Aigle, enseigne, hymne, manche, mémoire, mode, mousse, pendule, poste, tour, vase, voile.* State distinctly what each of them means when masculine and what it means when feminine. Place them in distinct columns, thus:—

Masc.	Fem.
Un aigle—(the English.)	*Une aigle*—(the English.)

8. Write fully—80 candidats, chapitre 80, 300 volumes, l'an 1800.

9. When is one thousand expressed by *mil,* instead of *mille?*

10. How is *en* introduced in sentences like these:—Give me a dozen; I shall not buy any more?

11. What peculiarities of orthography are there in the conjugation of the verbs, *Manger, placer, essuyer, espérer, rappeler, jeter, acheter?*

12. Translate into French:—It ought to be written. We ought to write it. It must be written. It could be written. It may be written. It can be written. It might be written. We may write it. We must write it. They must write it. We should write it. We could write it.

13. Give the infinitive mood, with the English, of the following verbs:—Frappe, mais écoute. Dormez-vous? Viens Qu'il accoure. Je suis venu, j'ai vu, j'ai vaincu. Fais ce que dois, advienne que pourra.

14. Conjugate the verb *S'en aller,* giving the first person singular and plural of all tenses, including the compound ones, with the English.

Part II.

Candidates for a Second-class Certificate are expected to answer the next four grammatical questions, and to translate the extract and idiomatic expressions which follow:—

1. Write the word *quelque* in the following sentences:—

(a) Un railleur s'attire toujours —— mauvaises affaires.
(b) —— bons traducteurs qu'ils soient, ils ne comprendront pas ce passage.
(c) —— soient les hommes, il faut vivre avec eux.
(d) L'ennemi a tiré —— mille coups de canon.

2. Write the word *tout* in the following sentences,—

(a) Ces fleurs sont —— aussi fraîches aujourd'hui qu'hier.
(b) Cette étoffe est —— soie.
(c) La pauvre femme est —— étonnée, —— stupéfaite de cette étrange nouvelle.

3. Give each participle past its proper spelling in these sentences :—

(a) Je vous ai *renvoyé* les livres que vous m'aviez *prêté*.
(b) Les avocats que j'ai *entendu* plaider ont compromis leurs causes.
(c) Les romances que j'ai *entendu* chanter sont charmantes.
(d) Les chaleurs qu'il a *fait* les ont *rendu* malades.

4. Give each verb in brackets in the following sentences, its proper mood and tense :—

(a) Je désire que vous [réussir] dans cet examen.
(b) Je ne pense pas que cela [pouvoir] vous embarrasser.
(c) J'ai peine à croire qu'il [avoir] déjà fini.
(d) Montrez-moi quelqu'un qui [être] plus consciencieux.

Translate into French :—

Would you know whether the tendency of a book is good or evil, examine in what state of mind you lay it down. Has it induced you to suspect that what you have been accustomed to think unlawful, may after all be innocent, and that that may be harmless which you have hitherto been taught to think dangerous? Has it tended to make you dissatisfied and impatient under the control of others; and disposed you to relax in that self-government without which both the laws of God and man tell us there can be no virtue, and consequently no happiness? Has it attempted to abate your admiration of what is great and good, and to diminish in you the love of your country and your fellow-creatures? Has it addressed itself to your pride, your vanity, your selfishness, or any other of your evil propensities? Has it defiled the imagination with what is loathsome, or shocked the heart with what is monstrous? Has it disturbed the sense of right and wrong the Creator has implanted in the human soul? If so—if you are conscious of all or any of these effects—or if, having escaped from all, you have felt that such were the effects it was intended to produce, throw the book into the fire, whatever name it may bear on the title-page. Throw it into the fire, young man. Young lady! away with the whole set, though it should be the prominent feature in a rosewood bookcase.—Southey.

Translate :—

Venir parler.	Donner dans le piège.
Venir pour parler.	Donner sur l'ennemi.
Venir de parler.	Donner sur le parc.
Venir à parler.	Donner sur les doigts.
En venir à parler.	En donner à garder.

Il en tient.	Je suis des vôtres.
J'y tiens.	Je n'y suis pas encore.
Je m'en tiens là.	J'en suis pour mes peines.
Tenez, tenez-vous à cela.	J'en suis encore à l'apprendre.

And also :—

(1.) What are you driving at?
(2.) He is not so easily imposed upon.
(3.) They left him in the lurch.
(4.) He is at his wits' end.
(5.) He does not know which way to turn.
(6.) If I were you, I would have nothing to do with it

Part III.

Candidates aiming at a First-class Certificate are expected to do justice to *any four* of the five following subjects :—

1. Grammar.—Answer the four grammatical questions in Part II.

2. Idioms.—Translate the above list of idiomatic expressions (in Part II).

3. Weights and Measures.—Explain in French the origin and meaning of the words *mètre*, *litre*, and *gramme*, and compare the *kilogramme*, the *hectolitre*, and the *kilomètre*, with the corresponding English weights and measures.

4. Literature.—Sketch briefly the life and name the principal works of any three of the following writers of the 17th century :—

Descartes.	Boileau.
La Rochefoucauld.	La Fontaine.
Pascal.	Fénélon.
Mme. de Sévigné.	Massillon.

5. History.—Write a short account of the "Ligue" in connection with the reign of Henri IV.; or, if you prefer it, write a short essay on the administration of Sully.

(To be continued.)

NEW PAINT FROM ANTIMONY.

About six months ago a patent was taken out by Messrs. Hallett and Stenhouse for the manufacture of a paint from native oxide of antimony—a mineral which is found in considerable quantities in Spain, Borneo, and other localities, where it is usually associated with the grey sulphide of antimony, from which it has been produced by the process of oxidation, which, as might be expected, is found to be more or less complete. This native oxide of antimony, whose colour varies from light-yellow to yellowish-red, occurs usually massive, and consists of antimony combined with oxygen in different proportions, and generally contains some sulphide of antimony, silica, &c.

The oxide is first reduced to coarse powder, and is then roasted for three or four hours, at a low red heat, with free access of air, in muffles or other suitable furnaces. During the process of roasting the sulphur and other volatile matters are expelled, the colour of the substance becomes much paler, and the residuary metal is converted, for the most part, into antimonious acid. The calcined product is then reduced to an impalpable powder by being ground in flint mills, and, when dried and mixed with oil, constitutes the paint.

The paint has a delicate stone colour, and is quite equal in body or capacity to the best white lead; while it possesses the great advantage of maintaining its colour in vitiated atmospheres—being not acted upon either by acids or sulphuretted hydrogen. This property renders it peculiarly adapted to interiors of ships, gas works, and hospitals. It is devoid of anything hurtful to workmen, either in its manufacture or use; and as (weight for weight) it will go fully 25 per cent. further, as a pigment, than the best white lead, and its price being considerably lower, the new antimony paint promises, ere long, to be very generally employed.

DISCOVERY OF GOLD IN THE VALLEY OF THE SASKATCHEWAN.

Mr. A. K. Isbister, author of a paper on the Hudson's Bay Territories, read before the Society last session, says:—

"I have just received a letter from the Red River colony, in the Hudson's Bay territory, announcing the discovery of a valuable gold field by a party of American miners from California, on the north branch of the Saskatchewan. This intelligence I see confirmed in recent papers published at St. Paul's, Minnesota, and it may therefore be relied on as accurate. Two gentlemen from California have recently arrived in that town with a considerable quantity of gold collected by themselves along the upper waters of the Saskatchewan, and they describe the yield and quality of the metal as promising to be quite equal to that of British Columbia, which I need hardly say occupies the opposite flank of the Rocky Mountains, and may therefore reasonably be inferred to be of a similar geological character, while we know that it is watered by streams which have a common origin in the same auriferous range with the northern tributaries of the Saskatchewan."

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS.

(*Continued from page 648.*)

Santo Domingo.—Santo Domingo is rich in copper and in other ores. There are districts abounding in rich copper ore which would yield a handsome profit to mining speculations. The legislature has endeavoured to facilitate such enterprises by granting privileges to such undertakings; but though in some instances the copper ore is met with on the surface, and requires merely to be transported to the seacoast, no capital has yet been found to commence the enterprise. Santo Domingo is still so little known that the want of proper information of its climate, resources, and institutions is the greatest obstacle to induce foreigners to employ their capital for the development of its riches.

Exports of the Island of Tahiti.—The island of Tahiti itself produces for exportation oranges and firewood. Cocoa-nut oil, pearl shells, and oranges form the principal articles of island produce exported. The two former commodities are for the most part sent to Valparaiso and Sydney, and occasionally shipments are made direct for England. Oranges are almost wholly exported to San Francisco, California, though, from time to time, cargoes are forwarded to Australia.

The Whale Fishery of Magdalena Bay.—"I also feel it my duty to report the following particulars relative to Magdalena Bay, on the coast of Lower Calafornia, obtained when there during the present month, as its navigable extent and importance as a whaling station, was, to us, new, and may prove interesting information. The captain of the whaling barque *Carrib* of San Francisco, states that from twenty-five to thirty American vessels fish those waters annually, for the cow whale of the black-fish species who resort to them for calving; they agree not to commence the run until 1st December; that the northern channel extends to Bellenas Reef, which makes the third outlet to the sea, north of Cape St. Lazarus; that in one opening there is a passage with a depth of five fathoms, though the rollers are heavy; that he has taken his ship seventy miles up this northern estuary by lightening her draft to twelve feet; that during the whaling time, the natives traffic with them at stations both in the south-western part of Amegas Bay and to the northward, exchanging cattle and venison for clothing, &c. Our only previous knowledge being from Sir Edward Belcher's survey, the remarks in Findlay's Pacific Directory, and a previous visit by Mr. Hill, the master of this ship, when with Captain Kellett in Her Majesty's Ship *Herald*, in 1843, neither having any idea of the navigable extent of it, determined me on seeing, so far as time permitted, the nature of this water, taking Mr. Hill, who is a thorough practical surveyor, we succeeded in getting so far as the second opening to the sea, finding the depth of water quite equal to the American captain's description, and, in many places, over five fathoms. The sameness of the Mangrove Islands with which this immense sheet of water abounds, makes the course of the channel somewhat difficult to keep in a boat, though the deep water lines would be clearly seen from the height of a few feet. We found fish of various kinds, turtles and shell fish; as also hares and wild fowl in abundance, but no sign of fresh water. The whalers obtain a supply of inferior and somewhat brackish water by sinking casks in the sand, and firewood in any quantity."

Home Correspondence.

FOREIGN WORKMEN AND THE GREAT EXHIBITION OF 1862.

Sir,—Being in Antwerp on a late occasion, to attend the European Art-Congress, I profited by the opportunity to extend my travels to the principal cities of art and industry in Holland, Prussia, Saxony, Hanover, the Rhine Provinces, and Belgium, in all of which I find the forthcoming Exhibition regarded with great interest, and the preparations both active and important (though at Amsterdam I perceived the erection of a Crystal Palace of extensive proportions, for an exhibition of their own). With these I have at present little to do, but will indicate the feeling of the foremen and workpeople as to their visiting London in 1862. Having questioned a great many of the higher classes of operatives, as also the artists and art-workmen, I find the thing most dreaded by them is the expense, not so much of locomotion to and from England, for they have full faith in trains of pleasure at low fares, as the price of doubtful lodgement in London, and living also, though of the two I think they fear the lodging-house or hotel most,—a dread founded upon the slight experience of their *confrères* in 1851. I have often been asked if the promoters of the Exhibition intended to provide for or protect the humble order of visitors next year, many of whom, though artisans of the first-class, are not able to make known their wants in either French or English.

Now, I think, Sir, that it is quite time that something should be done, either on the part of the Society of Arts or the Royal Commission, to meet this want—to give assurance to the humble *voyageur* of the aid he may expect. Certainly much could be done to provide temporary homes or camping-ground, at a small cost to the individual, but sufficiently remunerative in the mass—in fact, to do in a perfect manner what was improvised in the case of the Orpheonists' visit. I speak of the accommodation afforded to this body, unpopular as the arrangements were, as perhaps it is the only attempt made to locate a large body of visitors at a small charge and a short notice. I will not enter upon a debateable question, now at rest, but try to draw some experience therefrom. The Orpheonists have come and gone, had a warm reception in the wettest summer known, and had their payment for lodging returned by the corporation of London. What landlords could be more liberal?

Now, in 1862, I do not see why these great hotels at Islington should not again be brought into requisition (as indeed any other large buildings easily convertible), to lodge large numbers at moderate cost. They are splendid edifices, most conveniently situated by the North London Railway, affording easy communication both east and west of London, that can be seen at one view from their windows, an object of no slight importance to the stranger who may have to learn localities in but little time. When I last saw these hotels, the beds of the Orpheonists covered the floors of the great rooms in every direction, affording sleeping or rather resting places, of a hard and primitive sort, without chairs, place for baggage, or any screen whatever; the improvised lavatories being upon the ground-floor and free to all. With a very little arrangement, these and other places could be converted into lodgements for the mass of visitors, by dividing spaces to contain a small iron bedstead, two chairs, a table, lavatory, gas light, looking-glass, and three hat-pegs. No fire would be required or desired in the summer season.

For a convenient camping ground, I do not think a better spot could be chosen than that by the Corporation of London, at Islington, at least for one station, at a stated tariff, to be made known at all the railways in three or four languages.

In fine, it is much to be hoped that this or other schemes will be matured to tempt the humble *voyageur*, of limited means, to visit our shores, and to protect him whilst here. If we can, in 1862, but disabuse the foreigner of the idea that London is the dearest capital in the world, we shall have done much.

I am, &c.,

JOHN LEIGHTON.

Regent's-park, Sept. 24, 1861.

INTERNATIONAL EXHIBITION OF 1862.

Sir,—Will you allow me to submit for consideration, in respect to the International Exhibition of 1862, as well as for exhibitions in general, the following example of what I deem an important improvement in arranging the articles for exhibition, namely, placing together objects of competition for prizes, from whatsoever source derived. I can speak from experience, as a juror, of the great convenience and advantage of such a mode of classification for decision, as well as to the public for interest and instruction in inspection.

In the Transactions of the Highland Society, speaking of the Perth Show, it is observed :—

"We think we state the truth in saying that ninety-nine out of every hundred visitors, whether from our own or from foreign parts, greatly prefer the system adopted by the Society, of having harrows placed beside harrows, and ploughs beside ploughs, &c. It is quite distracting and unsatisfactory to hunt through general collections for the examination and comparison of implements. A great waste of time is the result. It is all very well for those who can afford to spend some days in the show-yard, to go with catalogue in hand and make the most minute inspection. But it must be kept in mind that the vast majority of visitors have only a limited time to make the round of the show-yard. The most complete and indexed catalogue would not assist them much. All wish to see what improvements are taking place in the manufacture of the various implements of the farm, and in no way can this be done so thoroughly and quietly as when they are arranged by the Society.

"No doubt it entails great inconvenience to the implement makers having their implements distributed over the yard, classified in the different sections. Their complaints may be well enough founded. There is no compulsion, however, on the part of the Society to make them enter their articles for competition. Exhibitors, therefore, may, if they choose, show implements only in their stands, and decline to undergo the disadvantages of the present system. So long, however, as the Society holds to its functions of awarding prizes for certain classes of implements, we do not see how they could be attending to the interest of the public but to follow the present system of classification. As Mr. Patterson suggests, exhibitors must first show duplicates of the implements they enter for competition, and let all their implements have the numbers of their stands affixed to them."

I am, &c.,

ONE OF THE INTERNATIONAL JURY FOR THE UNIVERSAL EXHIBITION AT PARIS.

INTERNATIONAL PHILANTHROPIC CONGRESS OF 1862.

Mr. Editor,—Having been one of the Vice-Presidents at the Meeting of the Congrès International de Bienfaisance, held in Frankfort-on-the-Maine, in 1857, and having presented a Report on that meeting to the Statistical Society of London, as well as having given to the National Association for the Promotion of Social Science an account of the origin of this International Association, and of the proceedings at its two past meetings, both of which papers are given in the Transactions of the respective Societies,* I feel it incumbent on me to point out an error in the very interesting announcement made in the last number of your *Journal* (Sept. 27), with reference to the contemplated Meeting of the Congress in London next year.

Both Mons. Ed. Ducpetiaux and Mr. Twining refer to it as the "fourth" meeting of the Congress, whereas it will be, in reality, only the "third" meeting, as may be seen by a reference to the published "Compte Rendu" of the two previous meetings; the first of which was held in Brussels, in 1856, and the second in Frankfort, in 1857. I have before me, also, a brief notice, or Report, published at Brussels, in 1857, which I received from M. Ducpetiaux, thus entitled :—"Congrès International de Bienfaisance —Deuxième Session à Francfort-sur-le-Main," in which, at page 2, the following announcement is made :—"La troisième Session du Congrès International de Bienfaisance aura lieu, selon toute probabilité à Londres en 1859, en coincidence avec le Congrès de Statistique, qui a tenu cette année sa troisième Session à Vienne."

Circumstances, in some respects similar to those which led to the postponement of the meeting of the International Statistical Congress in London until last year, rendered it desirable that the meeting of the International Philanthropic Congress should be also postponed. But the approaching Great Exhibition of 1862, when a large number of distinguished foreigners will be attracted to our metropolis, has long been considered the fitting occasion for a meeting of the Congress in London, and at the Council of the National Association for the Promotion of Social Science it has been repeatedly referred to as affording the opportunity for that interchange of experience with practical philanthropists of other countries, which is the main object of the international Association, and one so well calculated to promote, as well as to call into active operation, the feeling of common brotherhood and Christian charity. It is therefore matter for congratulation that our Continental neighbours have their minds already directed to this important object in connection with the Exhibition of 1862.

I am, &c., HENRY ROBERTS.

Athenæum Club, October 1, 1861.

* *Vide* "Journal of the Statistical Society of London," for September 1858. "Transactions of the National Asssociation for the Promotion of Social Science," for 1851, fol. 632. In reference to these Reports I would correct an error in my having named Frankfort as the place of meeting of the Congrès Penitentiaire, in 1847, instead of Brussels, where the idea of an Association International de Bienfaisance appears to have originated. The progressive stages of its development were as follows :—The "Congrès Agricoles, d'Hygiène Publique, et de Statistique," which assembled in Brussels in 1848, 1851, 1852, and 1853, were the occasion of bringing together individuals from the different countries actively engaged in the amelioration of the condition of the labouring and necessitous classes. And at the Congrès Statistique, held in Brussels in 1853, the desire was unanimously expressed of uniting in a general Congress those who, in different countries, are occupied with questions relating to the physical, the moral, and the intellectual improvement of the working classes, and the relief of the indigent. This idea was revived at the "Conference International de Charité," organised in Paris by the "Société d'Economie Charitable," on the occasion of the Great Exhibition held there in 1855, and it was followed by the convening of the Congrès International de Bienfaisance, the first meeting of which took place in Brussels in 1856.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, September 27th*, 1861.]

Dated 3rd July, 1861.

1692. R. Jolley, 47, St. John-street, Smithfield—An improved apparatus for heating, cooling, or drying, infusing, extracting, or absorbing vapours and gases for manufacturing, medical, or domestic purposes, and for preserving liquids and solids alimentary or otherwise.

Dated 20th July, 1861.

1834. M. Henry, 84, Fleet-street—Imp. in the method of, and apparatus for, obtaining an increased effect from lights. (A com.)

Dated 29th July, 1861.

1889. W. Busby and D. Busby, Liverpool—Imp. in street or road rails for omnibuses and other vehicles.

Dated 1st August, 1861.

1913. A. Powell, Liverpool—Imp. in the manufacture of boots, shoes, and other coverings for the feet. (A com.)

Dated 2nd August, 1861.

1921. J. E. Drouot, 4, South-street, Finsbury—Imp. in machinery or apparatus for kneading.

Dated 3rd August, 1861.

1932. P. O'Hanlon, Nile street, Kingston-upon-Hull—Imp. in marine and other steam boilers with reference to economy of fuel.

1936. J. Lewis, Rathmines, Dublin—Imp. in producing and treating printing surfaces, in producing and preparing transferring surfaces, in transferring, in producing impressions on an altered scale, in preparing or treating surfaces of lithographic stones, and in obtaining devices or designs; also in agents and apparatus used in some of such imps. parts of the invention being also applicable to photography, and to ornamenting pottery, porcelain, and glass.

Dated 6th August, 1861.

1956. W. Clark, 53, Chancery-lane—Imp. in bleaching and clarifying saccharine matters and in apparatus for the same. (A com.)

Dated 9th August, 1861.

1991. A. F. B. Falgas, 51, Rue de Malte, Paris—Imp. in the construction of trusses and bandages for hernia, and of hypogastric girdles or belts.

Dated 12th August, 1861.

2003. W. Edwards and E. Edwards, Coventry—Imp. in apparatus connected with railway breaks.

Dated 13th August, 1861.

2008. J. C. Horner, Avenue-road, Hammersmith—Certain imp. in looms for weaving. (A com.)

Dated 15th August, 1861.

2030. J. C. Rivett, J. Vickers, and S. Hayes, Farnworth, near Manchester—Imp. in machinery and apparatus for spinning and doubling fibrous materials.

Dated 20th August, 1861.

2079. J. Ellis, 62, Minories—Imp. in means for sizing corks or separating the larger from the smaller sized corks.

Dated 21st August, 1861.

2089. J. M. Murat, 51, Rue de Malte, Paris—Imp. in machinery or apparatus for shearing military hat tufts and other similar articles.

Dated 24th August, 1861.

2115. J. Driver, Keighley, and J. Jessop, Bradford, Yorkshire—Imp. in apparatus employed in washing, wringing, and mangling fabrics, and in the manufacture of part or parts of such apparatus.

Dated 30th August, 1861.

2157. A. J. Daumont, Paris—An improved umbrella.

Dated 3rd September, 1861.

2197. G. Bischof, jun., Swansea—Imp. in extracting copper and silver from ores containing those metals. (Partly a com.)

Dated 4th September, 1861.

2203. F. E. Scheider, 13, Rue Gaillon, Paris—Imp. in cartridges for breech loading fire-arms, and in the machinery for manufacturing the same.

Dated 6th September, 1861.

2230. J. J. Russell, Wednesbury—Imp. in preparing the ends of welded tubes previous to their being fixed in plates.

2232. W. Wild, Bury—Certain imp. in machinery or apparatus to be employed in the preparation of cotton and other fibrous materials for spinning, called "Slubbing frames and roving frames."

Dated 7th September, 1861.

2240. G. Norris, Brondesbury-terrace, Kilburn—Imp. in the manufacture of soap.

Dated 9th September, 1861.

2248. P. B. O'Neill, Hart-street, Bloomsbury—Imp. in screw wrenches or spanners.

2250. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in fire grates and furnaces for domestic and other purposes. (A com.)

2254. W. E. Newton, 66, Chancery-lane—An imp. in the construction of boots and shoes. (A com.)

Dated 11th September, 1861.

2258. L. P. Barré, 4, South-street, Finsbury—Imp. in tubular steam boilers.

2260. W. L. Thomas, Hill-street, Berkeley-square—Imp. in projectiles.

Dated 12th September, 1861.

2264. W. Stephens, Godolphin-road, Hammersmith—Imp. in mechanism or apparatus for ploughing and cultivating the land by steam and other power.

2265. C. Greaves, Old Ford, Bow—Imp. in apparatus for preventing waste of water from service pipes or cisterns.

2266. A. Turner, Leicester—Improved apparatus for enabling the guards and drivers of railway trains to communicate with each other.

2269. W. W. Clay, Nottingham—Imp. in knitting machinery.

2270. W. E. Gedge, 11, Wellington-street, Strand—Imp. in the nautical compass. (A com.)

Dated 13th September, 1861.

2271. J. Oliver, Longtown, Cumberland—Improved machinery for making bricks, pipes, and tiles.

2273. W. Farlar, Turnham-green—Imp. in sash fastenings, which imps. are also applicable to other purposes.

2279. R. A. Brooman, 166, Fleet-street—Imp. in machines for weighing and measuring corn and other grain. (A com.)

2281. J. B. Howell, Sheffield—Imp. in the manufacture of chains and chain cables.

Dated 14th September, 1861.

2285. G. Dixon, Wood-street—Imp. in the manufacture of upholsterer's trimmings.

2287. W. H. Crispin, Marsh-gate-lane, Stratford, Essex—Imp. in the manufacture of curved and angular paper tubes and pipes.

2291. J. King and J. Sutcliffe, Rochdale—Certain imp. in or applicable to machines for spinning and doubling.

2295. H. C. Jennings, Great Tower-street—Imp. in treating hides and skins.

2297. W. E. Newton, 66, Chancery-lane—Improved apparatus to be adapted to carriages for the purpose of checking or arresting their progress on inclines or when going down hill. (A com.)

2299. T. Webb, Artillery-terrace, Victoria-street, Westminster—Imp. in tills or receptacles for money.

Dated 16th September, 1861.

2301. M. Rae, Manchester—Imp. in lamps.

2303. J. Reeves, New York, U.S.—Imp. in electro-magnetic engines for obtaining and applying motive power.

2305. W. J. Hesketh and D. Parsell, Saundersfoot, Pembrokeshire—Imp. in steam boilers and furnaces whereby better to adapt them to burn all kinds of coal, more especially anthracite or stone coal.

2311. R. A. Brooman, 166, Fleet-street—An imp. in shirts. (A com.)

Dated 17th September, 1861.

2315. F. Wrigley, Manchester—Imp. in the construction, manufacture, and mode of securing armour for the protection of ships and fortifications against projectiles.

2319. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in machinery or apparatus for the manufacture of horse-shoe and other nails. (A com.)

2321. J. Lee and B. D. Taplin, Lincoln—Imp. in traction engines.

Inventions with Complete Specifications Filed.

2222. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Imp. in smoke-consuming furnaces. (A com.)—6th Sept., 1861.

2228. E. J. Hughes, 123, Chancery-lane, London—Imp. in watches. (A com.)—6th September, 1861.

Patents Sealed.

[*From Gazette, September 27th,* 1861.]

September 26th.

597. J. Bunnett.
762. W. Jeffs and J. Pennock.
772. J. Bremner.
774. J. C. Keen.
775. L. J. Vandecasteele.
777. R. A. Brooman.
778. W. Sorrell.
779. W. Stratford.
780. G. M. Coppo.
785. T. Sykes and B. C. Sykes, M.D.
786. John Cass.
787. G. Barton and E. Soar.
792. H. Medlock.
800. R. Searle.
809. J. G. Winton and T. W. Cowan.
810. J. H. Winder.
813. A. Huray and H. Leilé.
816. J. Sickels.
821. T. Wright and H. Wright.
836. D. Stone and C. Comer, jun.
868. W. H. Beddall.
876. F. Taylor.
889. J. Shand and S. Mason.
892. T. Don, T. Smith, and L. Horsfield.
893. C. Stevens.
949. C. Stevens.
1009. E. H. Bentall.
1010. E. H. Bentall.
1027. E. H. Bentall.
1050. J. H. Brown.
1076. W. E. Newton.
1492. J. D. Harding and W. H. Winsor.
1650. T. Swinnerton.
1676. S. H. Gerstle.
1781. W. Rigby.
1857. W. M. Cranston.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, September 27th,* 1861.]

September 23rd.

2195. H. Monier.
2261. J. L. Hancock and F. L. Hancock.

September 24th.

2156. C. Hall.
2181. A. Normand.
2364. R. Kennedy and J. Armstrong.

September 23rd (not produced).

2141. J. Wilson.

[*From Gazette, October 2nd,* 1861.]

September 28th.

2173. T. Britt.
2183. J. J. Russell.
2190. T. Preston.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, September 27th,* 1861.]

September 25th.

2070. T. Clayton and R. Harrop.

Journal of the Society of Arts.

FRIDAY, OCTOBER 11, 1861.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £433,000, have been attached to the Deed.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

During the past week the works have continued to advance with gigantic strides, and there seems no reason to doubt that the contractors, with their immense resources, could, if necessary, complete the building at even an earlier date than the one fixed upon. At present they have 1,080 men at work, of whom 960 are on the ground, the remainder being at Thames Bank, where the iron for the domes is being prepared.

The contract for this portion of the works has been taken by the Thames Bank Iron Company, and they have also undertaken to build the domes from the point where they spring from the columns. The erection of the eastern dome will commence immediately. Much of the work has been on the ground some days, only awaiting the fixing. Meanwhile the nave and eastern transepts are being rapidly pushed forward, ten ribs of the roof being raised in the nave, eight in the south-eastern, and two in the north-eastern transept. Eight windows of the clerestory in the nave are also in their places, and sufficient has been roofed in to prove that this part of the building is admirably adapted for exhibiting purposes. It can now be seen that the light is distributed in such a manner as to satisfy the wishes of every exhibitor. The scaffolding intended for the western dome has risen to five stories.

The picture galleries are progressing fast, and the visitor who may choose to mount the ladders which lead to them will be able to realise fully their noble proportions, as well as to admire the manner in which they are lighted, and which, (carried out so successfully by Captain Fowke, in the galleries of the South Kensington Museum,) was based upon a principle adopted by Mr. Sheepshanks, in his private gallery at Rutland-gate. The glazing of these top lights has already begun. The enormous angle pieces which are to bear the roof of the eastern tower, at the intersection of the Cromwell and Exhibition roads, may also be observed to be springing from the four corners.

It is intended that the central portion of the Picture Gallery, which is the part hereafter to be leased to the Society of Arts, shall be roofed with slate, and the material for the purpose is on the ground. The other portions of the building, with the exception of the glass courts, will be covered with felt in double thickness. This part of the work has also been let to a sub-contractor, who has moreover engaged to keep it in repair and watertight until the end of the Exhibition. The felt which covers the machinery shed is laid, and a portion of that over the roof of the nave.

The demands for space have now all been received, and amount probably to 10,000. In the course of this week will be known the whole amount of space which has been applied for, and which cannot be less than six times that at the disposal of Her Majesty's Commissioners. As many of the readers of the *Journal* are proposed exhibitors, it may not be uninteresting to them to know somewhat of the manner in which their applications will probably be dealt with.

As soon as it is known how much space has been applied for in each class, Her Majesty's Commissioners will proceed to allot a proportionate amount to each, which will be placed in the power of the different committees. For classes which have a national interest, such as railway plant, machinery, civil, naval and military engineering, education, &c., committees have been appointed who will allot the space entrusted to them to exhibitors in all parts of the country. For other classes, Metropolitan Trade Committees and Local Committees will perform the same operation. Applicants who wish to exhibit in classes which are not represented by National Committees, and who are removed from any town which has appointed a Local Committee, will have their claims submitted to the Metropolitan Trade Committees for such classes.

It is obvious that the space applied for being so much greater than that which can be allotted, the different Committees will have to exercise great discretion in the manner in which they apportion the space entrusted to them. It will be their duty first to expunge from the lists applications made for objects which have no interest in an industrial exhibition, or which do not fairly represent the industry of the country. Many intending exhibitors, under the idea that the space allotted to them will be in proportion to that demanded, have applied for a quantity far in excess of their actual requirements. These demands give no title whatever to any space, and it will be for the Committees to see that those who may be entitled to space have no more than is absolutely sufficient to meet their fair necessities. No one in any case can be considered an exhibitor until he has been so constituted by a Committee.

It is said that many exhibitors intend to use the cases which they have had made for former exhibitions; from the different character of the building in 1862 to that of any former exhibition, it would be but in few instances that such cases could be employed, even supposing the requisite amount of space were at hand on which to place them.

The following arrangements have been made since the last announcement:—

Venezula.

Senor Jose Antonio Carrillo, consul at Burdeos; John D. Powles, Esq., and James Kennedy Arthur, Esq., of London. Frederick Herbert Hemming, Esq., consul for Venezula, 25, Moorgate-street, London, will act as commissioner in London.

BUILDINGS FOR THE EXHIBITION OF 1862.

The following description of the Buildings is abridged from a pamphlet recently published*:—

The Site

of the principal portion of the buildings adjoins the Royal Horticultural Gardens at South Kensington. It lies between Prince Albert's-road on the west, Exhibition-road on the east, and Cromwell-road on the south. The ground belongs to the Commissioners for the Exhibition of 1851, and was purchased by them out of the surplus funds of that Exhibition.

The Character of the Structures,

unlike the uniform glass building in 1851, is varied, the different purposes for which the buildings are destined having been kept in view in designing them by their engineer and architect, Captain Fowke, R.E. The buildings provide on a large scale for four objects;—I. *Picture Galleries*, which require to be solid structures, secure from all accidents of weather, extremely well ventilated, and lighted at the top; II. Ample spaces of different forms, and lighted in different ways, for the *Exhibition of Works of Industry*, arranged in courts and galleries; III. Platforms and wide passages, for *Ceremonials and Processions*; and, IV. Accommodation for *Refreshments*.

The Picture Galleries

occupy three sides of a quadrangle. The largest gallery is in Cromwell-road; this is 1,150 feet long, 50 feet wide, and 50 feet high above the ground floor; being about as long as the Gallery at the Louvre at Paris.

The passage from end to end of this great Picture Gallery is uninterrupted, although the entrance is in the centre of it. The construction is of substantial brickwork. The piers at the entrance are 14 feet wide, and 7 feet thick; and the foundations throughout are of concrete, 5 feet thick. The walls will be lined with wood, and pictures may be hung if desired to a height of 30 feet. The lighting will be on the principle so successfully demonstrated in the Sheepshanks Gallery, which was the first *public* gallery perfectly lighted by day and gas light. These principles require that the quantity of light should be as great as possible, be subject to control, and obtained from above; and that the rays from the skylight incident on the pictures should in no case be reflected by their varnished surfaces, so as to strike the eye of a spectator while standing at a convenient distance for examining the pictures. The inflexibility of these principles, and the necessity for perfect ventilation, have regulated the architectural treatment of the present structure: as the light *must* come from the top, and the pictures *must* hang on the walls, there could therefore be no fenestral treatment in the upper walls. The greatest damage has been done to pictures by want of proper ventilation; the miasma from crowds is most injurious if not effectually removed. In this gallery ample provision has been made for ventilation in the only right and effective places. Not to waste valuable space, a floor has been provided beneath the Picture Galleries, and this must be lighted from the sides. Given, therefore, these conditions of lighting and ventilation and economy of space, as principles which must not be impaired by any considerations of architectural design, it would be interesting to see produced a better structural design for realising them than the present. Time will show how it may be decorated. The principal gallery is intended to receive the largest-sized oil paintings and cartoons.

The Entrance to the Principal Picture Gallery in Cromwell-road

will be through three noble recessed arcades. They are each 20 feet wide, and 50 feet high, and will look as imposing in their quantities as the principal façade of St. John Lateran, at Rome, and other Renaissance porticoes of Italy. The visitor enters a vestibule and hall, 150 feet long, and together 110 feet wide, which leads to the Industrial Halls and Galleries; whilst two flights of steps, 20 feet wide, lead on either side up to the Picture Galleries. These entrances invite elaborate decoration hereafter.

The Auxiliary Picture Galleries

are in Prince Albert's and Exhibition Roads. They are 25 feet wide, and about 30 feet high, and jointly 1,200 feet long, and are, of course, lighted and ventilated on the same principles as already described. They will receive the smaller-sized oil paintings, the water-colour paintings, architectural drawings, designs, and engravings.

The Industrial Buildings

will be constructed chiefly of iron, timber, and glass. They consist of the following parts:—Two duodecagonal domes which are 160 feet in diameter and 250 feet high, and are the largest of ancient and modern times. The dome of the Pantheon is 142 feet in diameter and 70 feet high; the dome in the Baths of Caracalla was 111 feet; Bruneleschi's, at Florence, is 139 feet in diameter and 133 feet high; the dome of St. Peters is 158 feet in diameter and 263 feet high from the external plinth; the dome of St. Paul's Cathedral is 112 feet in diameter and 215 feet high. The domes will be of glass, with an outer and inner gallery. It has been proposed to erect one of Messrs. Chance's dioptric lights at the top of one of them and to illuminate it at night. The vista from dome to dome, through the nave, is 1,070 feet. Each of the domes springs from the intersections of the nave with the two transepts. The nave and transepts are 100 feet high and 85 feet wide; the nave is 800 feet long, and the transepts are each about 635 feet long, including the domes. They are lighted on both sides by clerestory windows upwards of 25 feet high, and would reach a mile if extended. The roof will thus be water-tight, which a glass roof can hardly be made. The solid roofs invite decoration within and without. The building will be much cooler in summer and warmer in winter than a merely glass building. The nave, which runs east and west, will thus have a north light, undimmed by blinds, the value of which anyone having any knowledge of art fully understands, but which a public critic, not having the benefit of such assistance, was unable to appreciate. At 25 feet from the ground a gallery runs at each side of the nave and transepts. The level of the ground is five feet below that of the surrounding roads. By a happy conception, Captain Fowke has used this condition to obtain a most picturesque feature at each end. Instead of descending into the building upon entering,

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* Woodcuts to illustrate this paper are forwarded with the present number, and should be bound with the volume.

the visitor ascends two steps to a great platform or dais under each dome, and then may descend into the nave and transepts by three noble flights of steps, each 80 feet wide, which lend themselves to most decorative arrangements, or he may ascend into the galleries. The entrance is therefore made on a mezzanine, as it were, of the building. There is more than a mile and a half of upper galleries, some 50 feet and some 25 feet wide; two courts, each 250 feet by 86 feet; two courts, each 250 feet by 200 feet; two central courts—that at the north 150 feet by 86, that at the south 150 feet by 150 feet. All these glass courts are 50 feet high, and lighted from above. These courts will be the only portions which at all resemble the Crystal Palace.

The Entrances to the Industrial Buildings are in Prince Albert's and Exhibition roads. They are constructed in brick, and are susceptible of any amount of decoration. It is likely that one of the towers and some other portions may be completed as a sample of what the exterior architecture may be made. Each entrance is 55 feet wide. As many exits from the building will be provided as public convenience may require.

The Refreshment Halls and Arcades will be permanent buildings, and will present novel and striking features. They overlook, with a north aspect, the whole of the Royal Horticultural Gardens, with its cascades, fountains, &c. They will be cool, but with a sunny view. The halls will be 300 feet long and 75 feet wide; the two arcades will have about 1,500 feet in length and 25 feet in width. All kinds of refreshments, both light and solid, will be supplied. The visitor will be able to obtain,—in the morning, a *déjeuner à la fourchette*; at luncheon, Neapolitan ices or Bass's ale, and bread and cheese; at dinner, English roast beeef and plum pudding, or the latest inventions in cookery from Paris, with samples of the wines of all nations. At the clcse of the Exhibition, they will become the most delightful dining-halls in the metropolis, supplying a great public want in this respect.

The Machinery Galleries are the only portions which are obviously of a temporary character. They extend along the west side of the Royal Horticultural Gardens for about 1,000 feet in length by 200 feet wide, in four spans of 50 feet wide each. They are constructed of timber, most ingeniously contrived by Captain Fowke for strength, lightness, and cheapness, and offer a very useful suggestion for the cheapest kind of agricultural buildings. These are all of framed work, without any joinery.

The Laying-out of the Works commenced on the 9th March. The operation required great accuracy, and was performed by three separate agencies: by Mr. Marshall, for the contractors; and for the Commissioners by Mr. Wakeford, as well as by Sergeant Harkin, of the Royal Engineers, who was sent purposely by Sir Henry James from Southampton. Over a space of ground, 1,200 feet long by 600 feet wide, there was only a mean difference of three-eighth parts of an inch in three several and independent measurements. A bed of gravel underlies the whole ground. The foundations have been excavated to the gravel, and a base of concrete put in, on which brick piers, with York stone slabs, have been placed to receive the iron columns. The slabs for the columns of the great domes weigh upwards of a ton.

The Brickwork.

The bricks are from Kent, and have been supplied by Messrs. Smeed, of Sittingbourne. Upwards of ten millions will be used. The whole of the brick structure will shortly be roofed in, in order that the Picture Galleries may have plenty of time to dry.

The Iron Castings are executed at the Stavely Iron Works, Derbyshire; and Mr. Barrow, a leviathan among ironmasters, is himself superintending the operations. The castings are pronounced to be of first-rate quality. There are 166 round columns for the nave and transepts, 12 inches in diameter, connected with a like number of square pilasters; 312 eight-inch round columns, and 149 twelve-inch square columns, for the galleries; 138 eight-inch square clerestory columns, and 160 ten-inch square columns, supporting the floors of the Picture Galleries; 62 round columns for supporting the roofs of the glass courts; (put all the columns end to end, and they would extend from the Exhibition building, either eastward as far as the London Docks, or westward as far as Kew, or northward as far as Hampstead, or southward to the Sydenham Crystal Palace;) 1,165 girders throughout, 11,600 feet of pipes, 15,000 feet of gutters, 14,000 feet of railings, 1,000 brackets, 700 trusses and girders, 1,400 shoes, &c.: the whole is estimated to weigh nearly 4,000 tons. The castings were all to be delivered on the ground before the 30th September, which is about the time when the delivery of the iron-work for the Exhibition of 1851 was only beginning.

The Wrought Iron is supplied by the Thames Iron Company—the builders of the *Warrior*, iron-plated frigate. This will be used chiefly in the great domes and for the roofs. It is estimated to weigh about 1,200 tons. The bracings, trusses, railings, bolts, &c., are made by the contractors. Mr. Ashton, who fixed the ironwork for Sir Joseph Paxton's two glass buildings, is charged with the same duty here.

The Timber-work is being executed partly at Messrs. Lucas's works, at Lowestoft, and partly at Mr. Kelk's works at the Grosvenor Canal. It is estimated that about 17,000 loads will be consumed. For the windows below the Picture Galleries there are 32 window-frames 16 feet by 13 feet, and 68 window-frames 16 feet by 7 feet. For the top lighting of the galleries, 45,000 feet superficial of frames and glass are in preparation. For the clerestory lights of the nave and transepts, nearly a mile length of frames, 25 feet high, is preparing; and for the courts, upwards of 30 miles of sash-bars and glass. The framing for the Machinery Halls is preparing on the ground.

The Roofs will be covered with slates for the great Picture Galleries, and elsewhere with felt, except in parts, to show how ornamental roofing may be hereafter applied.

The Contract for the whole works has been let to Messrs. Kelk and Charles and Thomas Lucas, Brothers, whose tender was the lowest. These two large firms have become partners for this work. Each firm is known for its great administrative powers, and for having performed feats of construction not before attempted. Mr. Kelk built Mr. J. Fowler's iron bridge across the Thames at Pimlico in twelve months, even with a six weeks' stoppage of the works by a workmen's senseless strike; whilst the Chelsea Suspension Bridge, within a few yards, had occupied as many years in the "torpid hands of Government." Messrs. Lucas, in a period of only seven months, rebuilt and decorated Covent Garden Theatre! There can be no doubt that their contract will be completed by the 12th February, unless some unforeseen accident should prevent them. The whole responsibility for the nature and execution of the works rests with the contractors. Mr. Meeson, C.E., prepares the working drawings for them. All proceedings are submitted to Captain Fowke, R.E., who acts for her Majesty's Commissioners. He confers with a Building Committee, consisting of the Earl of Shelburne, Mr. W. Fairbairn, and Mr. W. Baker; and her Majesty's Commissioners reserve to themselves the final approval of everything. Captain Fowke is assisted by Captain Philpotts and Lieutenant Brooke, and certain non-commissioned officers of the Royal Engineers. Mr. Clemence is the contractors' foreman of works. No clerk of works is employed. The contract is of a threefold character: for the use and waste of the buildings a sum of £200,000 is to be paid absolutely; if the receipts exceed £400,000,

then the contractors are to take up to a further sum of £100,000; and if this sum is fully paid, then the centre acre of the great Picture Galleries is to be left as the property of the Society of Arts. Lastly, the contractors are bound to sell absolutely the remaining rights over the buildings for the further sum of £130,000, which may possibly be paid by the surplus receipts of the Exhibition, if the success be great, of which there is a good prospect.

Whether or not there shall be a surplus depends in great measure on the management. If there be a deficit, the Guarantors, who have liberally taken upon themselves the risk, must provide for it. If there be a surplus, the Guarantors will direct the destination of it.

THE WRECK REGISTER AND CHART FOR 1860.

This chart has now been issued for nine years in connection with the official register of shipwrecks on the coast and in the seas of the United Kingdom, annually presented by the Board of Trade to Parliament. It is hardly possible to overrate the importance of this document, for it details, with great accuracy, an average annual loss of 800 lives, and the destruction of about £1,500,000 of property yearly from these lamentable disasters.

The past year will long be remembered for its stormy character, which penetrated far into the summer, for between the latter end of May and the beginning of June, upwards of 250 shipwrecks occurred.

As might have been expected from the continued succession of bad weather, the number of shipwrecks during the whole year was unusually large, giving a total loss of 1,379. Whilst, however, wrecks and strandings have increased, collisions have happily decreased, being 298 against 349 in 1859; but the whole number of casualties of all kinds in 1860 is 146 above the annual average for the past six years. On the other hand, it is satisfactory to find, that although the number of wrecks and strandings has been greater than usual, the loss of life has been considerably less, being 264 under the annual average of the past nine years. The total loss of life from the 1,379 shipwrecks during the year was 536, whilst 2,152 persons were fortunately saved by life-boats, the rocket and mortar apparatus, shore-boats, and other means—a most gratifying and encouraging result, not only to the poor people themselves thus snatched from a premature death, but also to those who have toiled hard for many years past in organising and completing the means of saving life from shipwreck on our coasts.

With respect to the important services thus performed, there is a terrible sameness in their general character every year, though the details are ever new and ever interesting. It is the same story in one sense, but the several parts of which are infinitely varied. It is always a "brave ship" in distress, always the "winds and the seas roaring," always some "poor souls" who are in the direst extremity of danger. Happily, too, through the instrumentality of the National Life-boat Institution and other bodies, it is nearly always the same story on the humane side. The life-boat is always ready, and a brave crew is ever at hand to man her.

The great and unprecedented loss of life in 1859 was mainly attributable to the destruction of two or three large passenger-ships. It will be remembered that 870 lives were lost in two great calamitous disasters alone, viz.—the wreck of the *Royal Charter*, on the Anglesey coast, and the *Pomona*, on the Blackwater Bank, on the Irish coast.

The *Register* furnishes, as usual, some curious facts relative to the class of ships that are inevitably wrecked when overtaken by a gale of wind. Of the 2,725 vessels wrecked on our coasts during the past two years, 1,504—or more than half—were colliers and of that class; and 1,291 were timber-laden passenger ships and vessels in ballast.

Of these the schooners hold as usual their pre-eminence for wrecking, 912 of them having during the same period gone to pieces. Next to the schooners come the brigs, 644 of which have in the same time met a similar fate. It appears that of the 1,379 vessels wrecked last year, 554 were commanded by masters who were not required to have certificates of competency.

The annexed table shows that the classes of ships to which casualties most frequently occur are those between 50 and 300 tons burthen, which are usually employed in carrying coal, coke, ores, and stone.

	Vessels.
Vessels under 50 Tons	284
51 and under 100 "	393
101 " 300 "	557
301 " 600 "	105
601 " 900 "	25
901 " 1,200 "	9
1,200 and upwards "	6
Total	1,379

The direction of the wind which proved most destructive to vessels wrecked on our coasts last year is also given. 111 vessels were wrecked during the prevalence of the wind from S.W.; 128 from W.N.W.; and 104 from N.W. 8 vessels were wrecked during absolutely calm weather; 151 in a fresh breeze; 168 in a whole gale; 101 in a storm; and 139 in a hurricane.

Twenty-one wrecks took place from not heaving the lead; 2 from intemperance; 35 from general negligence and want of caution; 39 foundered from unseaworthiness; and 5 from defective compasses.

Some curious facts are given in the *Register* regarding the ages of the ships. It appears that when they should be most vigorous they are most feeble. Thus we find that, during the past three years, 377 vessels under 3 years old were wrecked; and 472 between the ages of 3 and 7 years; whilst 644 of them perished between the ages of 15 and 20.

The Wreck Chart shows clearly the site of each of the casualties from shipwrecks on our coasts during the year 1860.

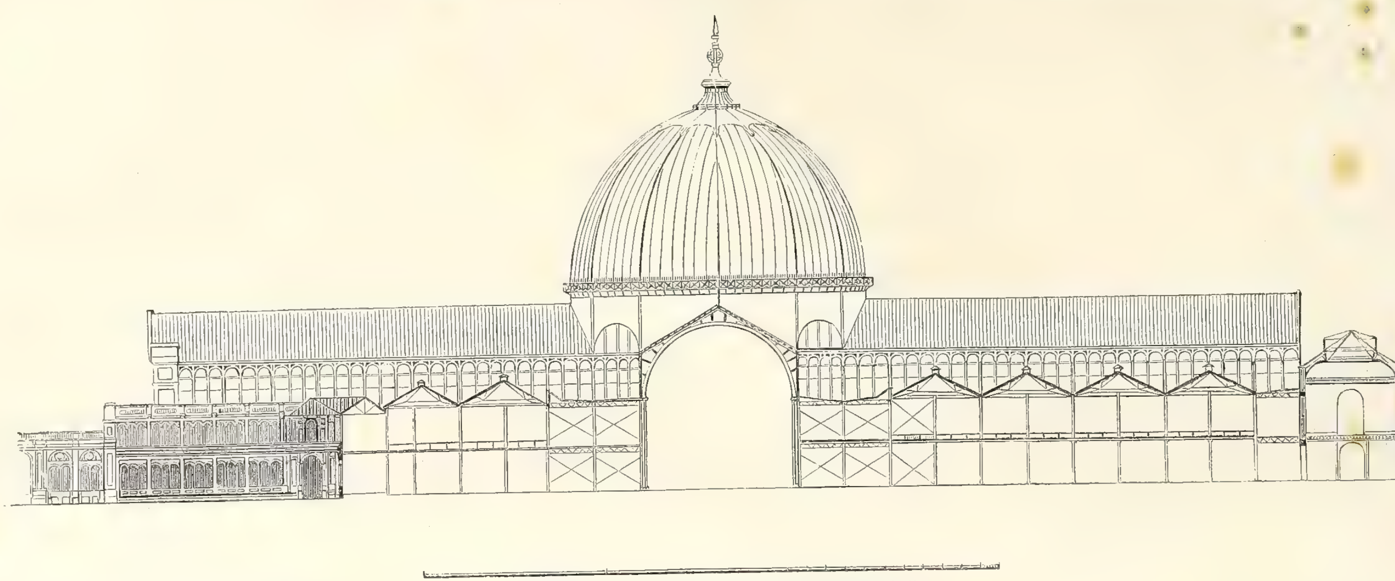
The estimated loss of property last year, as reported by the officers of some of the ships at the time of the several casualties is given. It is, however, absolutely impossible to ascertain correctly the loss of property from all the disasters that annually occur on our coasts. The destruction of fishing-boats, such as was witnessed lately at Yarmouth and Filey, is not referred to in the *Register*.

It is suggested that this lamentable state of things, by which a great loss of life and an immense destruction of property takes place every year, cannot be remedied until all vessels are subjected to a rigid inspection before they put out to sea, in order that it may be accurately ascertained whether they are well found and provided with life-boats, and with such a proper and suitable equipment as will enable them to combat successfully with the elements.

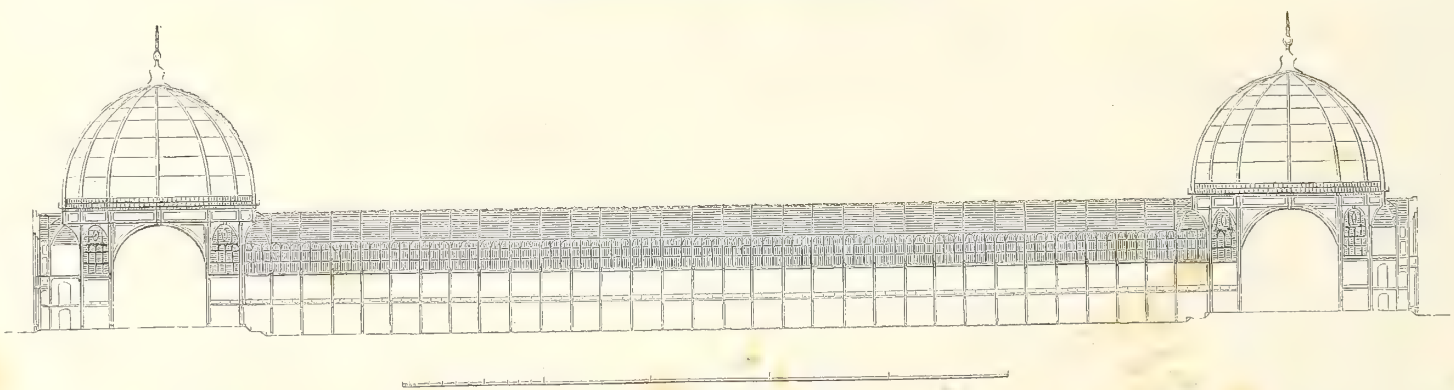
Great stress is laid on this point, because the loss of life from shipwrecks on the coasts alone of the British Isles within the last eleven years is really frightful to contemplate—it amounted to 6,883.

The districts where this immense sacrifice of human life took place were as follow:—

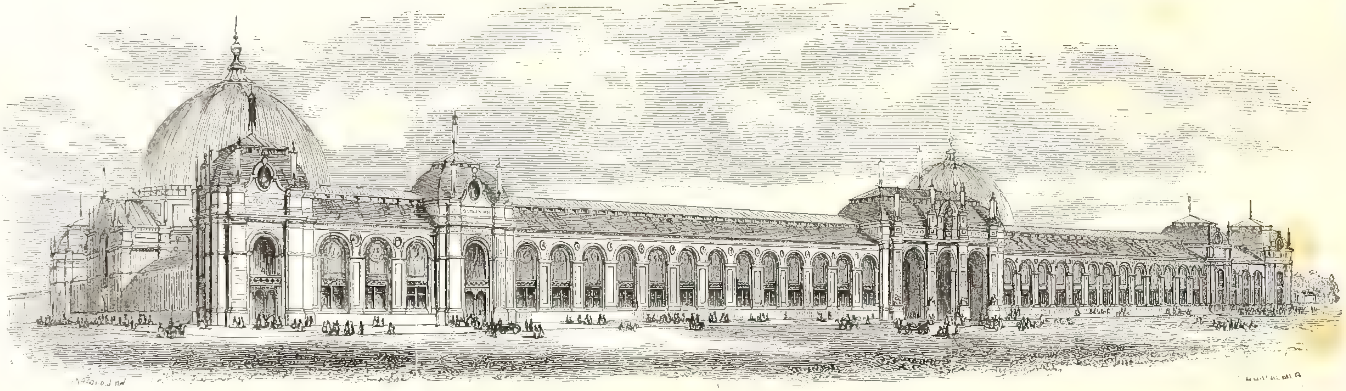
	No.
Farn Islands to Flamborough Head . . .	523
Flamborough Head to the North Foreland . .	957
North Foreland to St. Catherine's Point . . .	465
St. Catherine's Point to Start Point . . .	81
Start Point to the Land's End	445
Land's End to Hartland Point, including Scilly .	330
Hartland Point to St. David's Head . . .	440
St. David's Head and Carnsore Point to Lambay Island and Skerries, Anglesey	879
Skerries and Lambay to Fair Head and Mull of Cantire	1,453
Cape Wrath to Buchan Ness	197
Buchan Ness to Farn Islands	271
All other parts of the Coast	842
Total lives lost	6,883



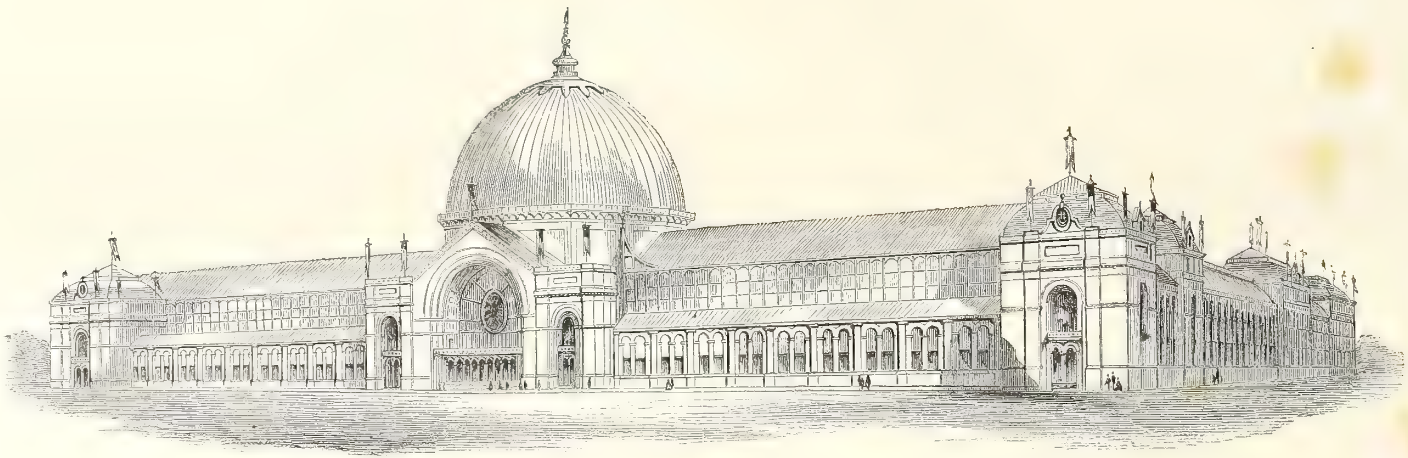
SECTION THROUGH DOME FROM NORTH TO SOUTH.



SECTION FROM EAST TO WEST.



FRONT OF THE PICTURE GALLERIES IN CROMWELL ROAD.



FRONT OF THE BUILDING FOR WORKS OF INDUSTRY IN PRINCE ALBERT'S ROAD.

THE NAVE FROM THE PLATFORM BELOW ONE DOME.

Between the Farn Islands and the North Foreland there are sixty-two life-boat establishments, and as many life-saving rocket and mortar stations. Here every winter some of the most daring and persevering life-boat services are performed. The poor sufferers are often snatched from the very jaws of death; and, on the lowest calculation, in addition to this large number of 1,480 persons who have perished in this district, one-third more would have swelled the death-roll had it not been for the services of the life-boats and the life-saving apparatus.

From the above account of the loss of life on the coasts it is seen that the most serious wrecks, resulting in the greatest loss of life, do not happen on the north-east coast of England, as is generally supposed, but on those parts of our coasts most frequented by large foreign ships. A few months ago a large American ship, the *Danube*, was coming up the Irish Channel. Mistaking her position, she found herself on some rocks in Cardigan Bay. A fearful storm was raging at the time. Her signals of distress were observed late in the evening. The Portmadoc life-boat, belonging to the "National Life-boat Institution," was immediately launched to the rescue of the crew, who had taken to their boats. After a night of great hardship and ceaseless toil, the life-boat brought on shore seventeen poor creatures, who were more dead than alive.

During the past nine years the total number of all casualties on the coasts and in the seas of the British Isles are thus given:—

In 1852... 1,115	In 1855... 1,141	In 1858...1,170
„ 1853... 832	„ 1856... 1,153	„ 1859...1,416
„ 1854... 987	„ 1857... 1,143	„ 1860...1,379

Making a total of 10,336

vessels lost in nine years; or 1 lost in every 210 British ships, and 1 in every 232 foreign vessels, and giving an average annual loss of 1,148 vessels on the coasts and in the seas of the United Kingdom.

The sacrifice of life from this great multitude of shipwrecks amounted to 7,001, or an average of 800 lives that meet with a watery grave from shipwreck every year on the coasts and in the seas of the British Isles.

In our narrow seas it is only natural that a large number of collisions should constantly take place. The number of British and foreign vessels entering British ports, including repeated voyages, every year amounts to upwards of 204,945, representing a tonnage of 29,176,196. Vessels clearing outwards, under the same circumstances, every year number 209,402, having a tonnage burden of 29,530,906. We must therefore be prepared for a considerable number of collisions, although, happily it is not increasing. During the past six years they have amounted to 1,788, giving an annual average of nearly 300.

It appears that during the past five years the number of lives saved on the coasts by life-boats, life-saving apparatus, shore and ships' boats, and other means, amounts to 11,495.

A few examples of noble life-boat services are given below.

On the 10th of February last, in the fearful gale from the east which caused such destruction to shipping and terrible loss of life on our east coast, the brig *Providence*, of Shields, coal laden, was driven on the Long Scarr Rocks, between the mouth of the Tees and Hartlepool. The Seaton Carew life-boat, belonging to the National Life-boat Institution, was quickly launched, and proceeding to her assistance through a high surf, took off her crew, eight in number, and landed them in safety. She had scarcely done so when she was again called to the aid of the brig *Mayflower*, of Newcastle, also coal laden, which had gone ashore on the East Gare sand, off the Tees mouth. The life-boat also took off her crew of eight men, and safely landed them. On the previous day this boat had, in conjunction with the West Hartlepool life-boat, endeavoured to save the crew of the brig *Alliance* of Guernsey, and schooner *Warnsbeck* of Shields, which were wrecked on the Long Scarr Rocks, but although every effort was made, they were unsuccessful, owing to the difficult position into which the vessels had driven on these dangerous rocks. As it was, the boat was herself injured and partially disabled thereby. "I wish you had been here on that disastrous Saturday and Sunday (9th and 10th of February)," writes the Honorary Secretary, the Rev. J. Lawson, of the Seaton Carew Branch of the National Life-boat Institution; "I am sure you would have been gratified to see the gallant way in which our crew worked, though composed, as you know, chiefly of landsmen. They were going from 9 a.m. on Saturday until eleven a.m. on Sunday, without rest, and not only attending to our own life-boat, but helping to man the West Hartlepool boat when short of hands."

Again, on the 1st of January, 5 men were saved on the Doomed Bar Bank, Padstow, from the Brigantine *Nugget*, of Bideford. From January 1st to the 6th, 32 men were saved by the Institution's boats, and one vessel was brought safely into harbour. But sometimes darkness is added to the perils which the life-boat men encounter in their exertions on the stormy deep. At Lyme Regis, for instance, the word was given during one of the winter nights that a vessel was in the offing in distress. It was "pitchy dark." A strong gale was blowing, and a heavy surf beating on the shore, but the life-boat men felt that duty called, and they did not hesitate. They went to sea as if it were to their fire-sides they were going; and they were successful in saving a ship's crew. The brief narrative of this adventure tells us that very few on shore believed the life-boat "would ever return," the night was so awful; "it was sufficient to appal any one entering the life-boat."

The payments to the crews of the life-boats are placed in the annual report of the Life-boat Institution, opposite the services thus rendered. For instance, the 16 men belonging to the brigs *Providence* and *Mayflower*, mentioned above, were saved for the sum of £25. At Portmadoc, in a heavy gale with a terrific surf, 17 men were saved for £14. This is about 17s. a head, and flesh and blood is certainly cheap at that rate. The Carnsore life-boat saved 19 persons, at a cost of £22 14s. Here is a strong claim upon the national benevolence, and fortunately it is becoming day by day more openly acknowledged, just as the merits of the National Life-boat Institution become more widely known.

Public and private gratitude calls for the support of this Institution, and some instances have been recorded which show how beautifully gratitude works, and how sweetly its work is repaid. The Carnsore life-boat, mentioned above as saving 19 people from shipwreck, was the "thank-offering" of a lady who was saved from drowning. One sees a striking appropriateness in that thank-offering, as an example of the ruling which brings good out of evil. There is another instance recorded of a similar character. Two ladies, in memory of a departed sister, placed a life-boat at Llandudno, in North Wales, and call it the *Sisters' Memorial*. The memory of departed worth, or departed affection, could not be preserved in a more fitting manner. It is to keep these benevolences in active operation—to endow them for ever, as it were—that the Life-boat Institution appeals to the public. It is an appeal that will stand any test—a cause that only requires to be known to insure a sufficiency of help to keep up its large life-saving fleet of 115 life-boats, and gradually to increase their number.

EXAMINATION PAPERS, 1861.

(*Concluded from page 759.*)

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in April and May last:—

GERMAN.

THREE HOURS ALLOWED.

Each candidate is expected to translate one of the following passages; to answer some of the grammatical questions, and turn into German several of the sentences and pieces given for this purpose.

Section I.

1. Tiefe Stille herrschte in Prag, als die Sachsen am andern Morgen davor erschienen: keine Anstalt zur Vertheidigung, nicht ein einziger Schuss von den Wällen, der eine Gegenwehr der Bewohner verkündigte. Vielmehr sammelte sich eine Menge von Zuschauern um sie her, welche die Neugier aus der Stadt gelockt hatte, das feindliche Heer zu betrachten; und die friedliche Vertraulichkeit, womit sie sich näherten, glich vielmehr einer freundschaftlichen Begrüssung, als einem feindlichen Empfange. Aus dem übereinstimmenden Berichte dieser Leute erfuhr man, dass die Stadt leer an Soldaten, und die Regierung nach Budweiss geflüchtet sei. Dieser unerwartete, unerklärbare Mangel an Widerstand erregte Arnheims Misstrauen um so mehr, da ihm die eilfertige Annäherung des Entsatzes aus Schlesien kein Geheimniss, und die Sächsische Armee mit Belagerungswerkzeugen zu wenig versehen, auch an Anzahl bei weitem zu schwach war, um eine so grosse Stadt zu bestürmen.

2. Der Kaiser Friedrich war ein gutgesinnter, nur allzu friedlicher und ruhiger Herr, dessen lange Regierung wenig Rühmliches für Deutschland enthält. Seine Zeitgenossen haben ihn abgebildet, wie er Edelsteine auf einer Goldwage abwägt, oder den Himmelglobus in der Hand sich mit ein paar Gelehrten über den Stand der Gestirne bespricht. Allein in den Lauf der Geschäfte mochte er nicht mit kräftiger Hand eingreifen. Wenn man ihm Missbräuche vorhielt, so meinte er, es möge wohl nirgends ganz gleich and recht hergehen; wenn gehandelt werden sollte, so glaubte er oft es werde sich schon alles von selbst zurechtfinden. In seinen eigenen Angelegenheiten verhielt er sich fast wie ein Beobachter; er sah gern in den Dingen das Allgemeine, Beherrschende, welches allerdings oft die Abweichung wieder herstellt. Allein zu solcher zur Unthätigkeit verleitenden Seelenruhe waren die Verhältnisse der Zeit zu dringend.

3. Solltest du das alles in des Königs Gegenwart wiederholen?

Desto schlimmer, wenn mich seine Gegenwart abschreckte. Desto besser für ihn und für sein Volk wenn er mir Muth machte, wenn er mir Zutrauen einflösste, noch weit mehr zu sagen.

Was nützlich ist, kann ich hören wie er.

Ich würde ihm sagen: Leicht kann der Hirt eine ganze Herde Schafe vor sich hintreiben, der Stier zieht seinen Pflug ohne Widerstand; aber dem edlen Pferde, das du reiten willst, musst du seine Gedanken ablernen, du musst nichts Unkluges unklug von ihm verlangen. Darum wünscht der Bürger seine alte Verfassung zu behalten, von seinen Landsleuten regiert zu sein, weil er weiss, wie er geführt wird, weil er von ihnen Uneigennutz, Theilnehmung an sein Schicksal hoffen kann.

4. Schön is der Friede! Ein lieblicher Knabeü
Liegt er gelagert am ruhigen Bach,
Und die hüpfenden Lämmer grasen
Lustig um ihn auf dem sonnigen Rasen;
Süsse Töne entlockt er der Flöte,
Und das Echo des Berges wird wach,
Oder im Schimmer der Abendröthe
Wiegt ihn in Schlummer der murmelnde Bach.
Aber der Krieg auch hat seine Ehre,
Der Beweger des Menschengeschicks,
Mir gefällt ein lebendiges Leben,
Mir ein ewiges Schwanken und Schwingen and Schweben
Auf der steigenden, fallenden Welle des Glücks.
Denn der Mensch verkümmert im Frieden;
Müssige Ruh' ist das Grab des Muths,
Das Gesetz ist der Freund des Schwachen,
Alles will es nur eben machen,
Möchte gern die Welt verflachen;
Aber der Krieg lässt die Kraft erscheinen,
Alles erhebt er zum Ungemeinen,
Selber dem Feigen erzeugt er den Muth.

GRAMMAR AND MEANING OF WORDS.

(*a.*) How do German substantives form their plural in the different declensions?

(*b.*) When a substantive forms the genitive singular in s, es, n, ns, or n, how are the other cases formed?

Give a few examples in answer to both these questions.

(*c.*) Translate: This house is large; that one is larger; but my brother's is the largest house I ever was in. Which is the largest house in town? This is not my youngest brother's garden; it is that of my oldest aunt. It was not my book; it was yours. They were not our books; they were theirs.

(*d.*) Correct the bad grammar in the following sentences:—

Wann ich tretete in dem Zimmer, ich sah ihm auf das Sopha sitzend.

Nach ich dieses hatte gesagt, ging ich in dem Hause.

Gestern er war noch hier.

Sonst er besuchte mir oft; jetzt er nie kommt zu mich.

Ich habe dieser Morgen zu abschreiben mehreren Briefen, welche noch mit die Post müssen gehen ab.

Kennen Sie der alt Mann, wer war hier dieser Abend?

(*e.*) State the difference between the following words (if possible, in German), and add a few examples:—

Sitzen und setzen; stehen und stellen; liegen und legen; verschwinden und verschwenden; ertrinken and ertränken; nach, nachher, nachdem; langen, erlangen, verlangen; ausgehen und hinausgehen.

(*f.*) What cases or prepositions are governed by the following verbs? (State also the cases governed by each preposition).

Kommen, schicken, nachahmen, sich besinnen, sich verlassen, warten, aufwarten, sich anmassen, danken.

(*g.*) What is the difference between:—

Ich stehe ihm bei, and ich stehe bei ihm; ich laufe nach ihm, and ich laufe ihm nach; er theilt es mit mir, and er theilt es mir mit.

(*h.*) What is the difference between:—

Bande, Bände and Bänder; Worte and Wörter; Tuche and Tücher; Gesichte and Gesichter.

Section II.

Translate ten of the following sentences, either in English or German characters, but very distinctly.

1. He who promises more than he knows he can perform, deceives the person to whom he makes the promise.
2. What is truth? said a well-known personage to one who alone could have told him, and, without waiting for an answer, rose and went his way.
3. Do not most of us do the same?
4. He who does all the good he can does enough.
5. I was to have called on the Prussian ambassador, but I would not.
6. I would have called on him, if I could have spared the two or three hours which I should have had to wait in the ante-room, before I should have been admitted to His Excellency.
7. I think with you, that waiting in this manner is a great loss of time, and very tedious.
8. Why did you not go out yesterday morning?
9. I should have been very glad to have gone out, but I could not.
10. Why could you not?
11. Will you be so good as to tell me why you could not?

12. With pleasure. I was not quite well the evening before, and had sent word to my doctor to come and see me in the morning.
13. Having done so, I was obliged to stay at home, and to wait for him.
14. Can you recommend me any thing to translate from German into English?
15. Having much leisure in the evening, I should like to employ myself with something profitable.
16. What do you understand by profitable?
17. If you mean something that produces money, I would not advise you to spend your time in translating.
18. There are so many people who translate for amusement, that publishers pay scarcely anything for translations.
19. All the prisoners were to be shot the following morning.
20. Of this the commander-in-chief was informed in time to dispatch a courier to his subordinate, to stay this cruel and needless effusion of blood.
21. But unfortunately, when the courier arrived, several of the wretched men were already shot.
22. The remainder, however, were pardoned.
23. The town is ours.
24. How did it come into our hands?
25. It was captured by our brave troops through a surprise in the night.
26. There were more than 500 prisoners taken.
27.* It is now sixteen or seventeen years since I saw the Queen of France, then the Dauphiness, at Versailles; and surely never lighted on this orb, which she hardly seemed to touch, a more delightful vision. I saw her just above the horizon, decorating and cheering the elevated sphere she just began to move in—glittering like the morning star, full of life, and splendour, and joy. Oh! what a revolution! and what a heart must I have, to contemplate without emotion that elevation and that all.—Burke.

Subject for a short and concise Essay, for First-class Certificate.

Durch wen und auf welche Weise verlor Kaiser Karl V. die Früchte des Sieges bei Mühlberg?

FREE HAND DRAWING.

THREE HOURS ALLOWED.

The drawings to be made in pure outline.
Draw the head which is placed before you the size of life.
Draw the plant and flower-pot about one-third the size of nature.
Draw, from memory, a door and porch of a cottage.
Draw, from knowledge, a cube of four feet, in the proportion of about one-inch to a foot.

DIRECTIONS FOR THE LOCAL EXAMINER IN FREEHAND DRAWING.

Place the best plaster bust which can be obtained on a pedestal or table four feet high, for the candidates in freehand drawing to copy.
Also, a plant or flower in a flower-pot, measuring together nearly two feet.

MECHANICAL DRAWING.

THREE HOURS ALLOWED.

The constructions must be accurate, and clearly show, by plain and dotted lines and letters of reference, the theoretical principles on which they are based.
No candidate must solve more than one question from any Section; no deviation from the conditions is admissible.

* To be done for a First-class Certificate.

I.

1. Draw a square of 3 inches side; divide each of its diagonals into 9 equal parts; through the points of division draw lines parallel to the diagonals; these parallels to end in the sides of the square.
2. Draw 10 concentric circles at $\frac{1}{10}$ inch apart, the largest to be 1·5 inches in radius.
3. Inscribe three equal circles in one of 1·5 inches radius, each circle to touch the other two.
4. Divide a circle of 2 inches radius into 32 equal sectors.

II.

1. Construct a triangle, its sides being in the ratio 2·5 : 3 : 3·75 and their sum equal 5 inches.
2. Divide a line 4·5 inches long into two segments such that the rectangle made with them shall be 3 square inches area.
3. Construct an equilateral triangle and a regular pentagon each of 4 square inches area.
4. In a circle of 3 inches diameter inscribe a rectangle having its sides as 2: 3.
5. Divide a square of 2·5 inches side into 5 equal areas by lines drawn through one angle.

III.

1. Draw an ellipse its axes being 3 and 2 inches.
2. Draw a parabola, its focus being at 1 inch from the vertex.
3. Draw the involute to a circle of 1·5 inches radius.
4. Draw the cycloid generated by a circle of 1 inch radius.

IV.

1. Draw the projection of a square of 2 inches side, one corner resting on the paper, two others 1 inch and 1·5 inches above it.
2. Draw the projection of a regular pentagon of 1·5 side, when one of the sides is inclined to the paper at 20°, another inclined at 35°.
3. Draw the projection of the same pentagon when its plane is inclined at 50°, and one diagonal inclined at 30° to the paper.

V.

A prism is 3 inches long with a square base of 1 inch side.
1. Show this prism by a plan and elevation when one diagonal of the solid is vertical.
2. This prism is cut by a plane passing through points in three of its edges at $\frac{1}{4}$; $\frac{1}{3}$; $\frac{1}{2}$; their length, determine the real form of the section.
3. A pyramid is 4·5 inches high; its base is a hexagon of 1 inch side; show it by a plan and elevation either
   - *a.* When one edge is horizontal.
   - *b.* When one face is vertical.
   - *c.* When no face nor edge is either horizontal or vertical.

VI.

1. Draw the plan and elevation of a cube of 2 inches edge, when the planes of two of its faces are inclined to the paper at 30° and 70°.
2. Three spheres of 5; 1; 1·75 inches radii rest on the paper, each sphere touching the other two; draw a plan of them, showing the points of contact.
3. A cone 4 inches high, its base 1 inch radius, lies on its side on the paper; draw its plan, and show a shadow of it, the direction and inclination of the sun's rays being taken at pleasure.
4. Determine at what inclination to that of the base a plane must cut a cylinder, so that the area of the section may be double that of the base.

VII.

1. Two parallel lines 3 inches long and 1·5 inches

distant from each other are inclined to the paper at 35°, but the end of one is 1 inch, and that of the other at 1·75 tinches above the paper.

2. Two indefinite planes intersect each other in a line inclined at 40°, one of them is inclined at 50° the other at 60°, determine the angle contained by the planes.

3. Each of three indefinite planes is perpendicular to the other two, one of them is inclined at 25°, another at 50°, show the three by two horizontal lines in each, at any level.

VIII.

The distance of the eye from the plane of the picture is six inches, the object to be represented in perspective is the square prism described above at paragraph V.; its position may be at pleasure.

1. When the edges are parallel to the plane, and one of them in it, the planes of the bases being one and two inches distant from the horizontal plane.

2. When one edge of the base is parallel to the plane of the picture, and the plane of that base is inclined to the picture at 50°.

3. When no edge of the solid is parallel to the picture.

4. When one diagonal of the solid is perpendicular to the plane of the picture.

THEORY OF MUSIC.

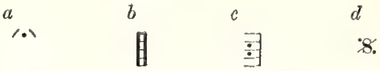
THREE HOURS ALLOWED.

I. Rudiments of Musical Grammar.

1. Explain the following words,—Clef, Syncopation, Andante, Signature.

(2.) What are the uses of these characters?

a b c d



3. How many sounds are represented by the following?

4. How does *a* differ from *b*?

a *b*

5. What intervals are formed by the following?

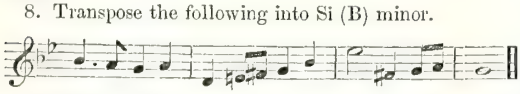
a *b* *c* *d* *e* *f*

(To be answered on music paper.)

6. Write a bar of music in each of the following kinds of time,—C, $\frac{3}{4}$, $\frac{6}{8}$.

7. Write the signatures of Sol (G), La (A), Si (B), Do (C), major, and of Sol (G), La (A), Si (B), Do (C). minor.

8. Transpose the following into Si (B) minor.



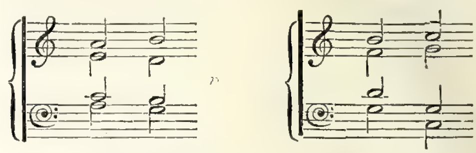
9. State anything you know about the composer Handel.

II. Harmony and Counterpoint.

1. How does a discord by suspension differ from a fundamental discord?

2. Point out the errors in the following:—

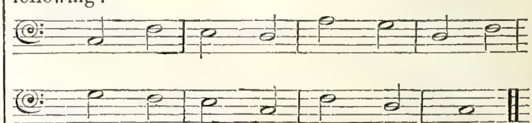
a *b*



3. Resolve the following:—

4. Add three parts to the following:—

5. Add a part, in any species of counterpoint, to the following:—



6. Write out any psalm tune, chant, or other melody that you can remember, with a bass. Fill in the other parts as far as you can.

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS.

(*Continued from page* 760.)

Madeira.—Cultivation of Sugar.—Hitherto the staple article of export has been wine; but, in consequence of the total failure of the vintages since 1851, caused by the vine disease generally known by the name of "Oidium Tuckeri," the quantity exported during these years has greatly decreased. The cultivation of the sugar-cane is being greatly extended, and is being substituted for that of the vine, most of the old vines having died, and the growers being discouraged from planting young vines, owing to the continuance of the disease rendering their labour therewith altogether unproductive. The whole of the juice of the sugar cane has as yet been converted into spirit, which, with the exception of twenty-seven pipes exported to Portugal, has been all consumed on the island.

Cloth, Carpets, and Goods of Poland.—The cloths made in Poland are of light description, and not so durable as manufactures of similar price and appearance in England. In former days, an export of cloth took place to Russia and China. This still, I believe, goes on to a certain extent, but since the abolition of the Russo-Polish Tariff, it has become impossible to state the data of such exports, while it appears beyond a doubt that the importation of Russian cloth to Poland has been growing in importance of late years. I have heard complaints made on this score, but, in the absence of data, cannot state how far they may be well grounded. The manufacture of carpets at Warsaw, which, under English direction, has reached much perfection, depends altogether on the high

duty, which is not to be reduced. The cotton goods produced are extravagantly dear, and even now, prohibited as they are, can hardly compete with British, Prussian, or Belgian articles of like nature. Their cost is nearly double that of similar productions in England.

Sugar.—Both in the kingdom of Poland and in the contiguous provinces to the south and east, the cultivation of beetroot, and the conversion of it to sugar, form a favourite speculation of the great land proprietors. The number of sugar mills has reached fifty-two, and I am informed that in the Government of Kiew there are not less than eighty. Millions of pounds are now produced where formerly they could be numbered by thousands. The iron and copper manufactures of Warsaw cannot supply the necessary machinery fast enough, and the workshops of Birmingham and Liège are put largely under contribution in consequence. The old feeble machinery is being everywhere replaced by the most powerful presses, and the only limit of the manufacture, more particularly in the conterminous provinces, arises from the dearness and scarcity of fuel. For the larger and more expensive machinery used in sugar or other factories, foreign countries are much trusted to, although everything of the sort demanded can be, and is to a certain extent, made in Warsaw. Machinery comes in free of duty, and the manufacturers of Warsaw find it impossible to meet the calls upon them without at the same time becoming merchants.

Agricultural Machinery of all sorts is made in Warsaw, after English models. Agricultural implements with the last improvements for the economy of labour, have come very much into fashion, and the attention of the country gentlemen is constantly directed towards them. In this respect a very satisfactory movement is apparent. The consequent demand in the manufactures of Warsaw for agricultural purposes is far more than they are able to supply. One firm, in 1856, sold no less than 400 threshing-machines, which are made on a somewhat simpler plan than those commonly used in England. The knives for chaff-cutters, scythes, sickles, &c., are nearly all imported from England.

Home Correspondence.

INTERNATIONAL PHILANTHROPIC CONGRESS OF 1862.

Sir,—I gladly avail myself of the opportunity afforded me by my worthy friend Mr. H. Roberts, (See *Journal of the Society of Arts*, October 4th, page 761) for explaining the discrepancy between the present mode of numbering the sessions of the Philanthropic Congress and that which has hitherto prevailed.

The gathering of philanthropists organised at Paris in 1855 by the Société d'Economie Charitable, and which held its sittings in the spacious building of the Société d'Encouragement pour l'Industrie Nationale, was, both in character and in importance, a Congress, as may be seen by the *Compte-rendu* published in the volume of the *Annales de la Charité* for that year. Nevertheless, as this meeting was convened under the title of Réunion Internationale de Charité it has been passed over, and the Brussels and Frankfort Conferences have been generally styled 1st and 2nd session of the International Philanthropic Congress. The Société d'Economie Charitable having resumed the leadership, it is quite natural that its former exertions should be fully recognised, and that the Paris Conferences should be considered as the 1st session, and the one proposed for 1862 as the 4th. This is a matter of courtesy between my continental friends, in which I have thought it best not to interfere. In order, however, to prevent confusion, it may be as well to designate in future the several sessions by their locality rather than by their numerical order.

I am, &c.,
T. TWINING, Junr.

Twickenham, Oct. 7th, 1861.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, October 4th*, 1861.]

Dated 18th June, 1861.

1568. T. Webb and J. Craig, Tutbury, Staffordshire—Imp. in machinery or apparatus for spinning, doubling, and winding cotton and other fibrous materials.

Dated 8th July, 1861.

1732. T. Cobley, Meerholz, Germany—An improved process for the manufacture of fluo-silicates and silicates of lead and baryta, and for the application of the same to various purposes in the arts and manufactures.

Dated 9th July, 1861.

1734. T. Cobley, Meerholz, Germany—An improved process for the treatment of silicates of metallic and non-metallic bases and other siliceous compounds, as slags, scoriæ, and such like, in order to recover the said bases, and also in the production of fluo-silicic and silicic acids.

Dated 13th July, 1861.

1760. G. Rydill, Dewsbury, Yorkshire—An improved smoke consumer and condenser suitable for factories, railway engines, steam ships, furnaces, brick kilns, cinder ovens, bakehouses and other purposes, namely, ventilation of factories, houses of parliament, places of public worship, public institutions, dwelling houses, streets, coal mines, railway tunnels, mineral mines, iron works.

Dated 15th July, 1861.

1775. J. C. Coombe and J. Wright, 42, Bridge-street, Blackfriars—Imp. in the manufacture of glass, pottery, porcelain, and other ceramic and plastic wares.

Dated 24th July, 1861.

1854. J. Bidard, 1, Rue St. Cecile, Marseilles—Imp. in machinery or apparatus for turning and planing metals, the tool advancing sideways and cutting in an oblique position.

Dated 5th August, 1861.

1937. F. Richmond and H. Chandler, Salford, and W. B. Ritchie, Belfast—An improved sack holder.

Dated 9th August, 1861.

1984. L. Vassiviere, Lyons—An improved smoke consuming apparatus.

Dated 15th August, 1861.

2039. J. Combe, Belfast—Imp. in machinery for hackling flax and other fibrous substances.

Dated 20th August, 1861.

2064. A. S. Rostaing, Dresden—Imp. in the construction of spectacles.

Dated 21st August, 1861.

2085. A. Stein, Edinburgh—Imp. in distillation.

Dated 22nd August, 1861.

2099. R. Telford, Birmingham, and J. Sanders, Clifton—A substitute for castors for furnitue.

2101. T. F. Doyle, 3, Guildford-place, Russell-square—Imp. in means or apparatus for raising and forcing fluids.

Dated 26th August, 1861.

2124. A. Lechene, 9, Stanhope-street, Hampstead-road, and C. Nathan, 17, Westmorland-street, Pimlico—Imp. in the manufacture of ladies' collars, cuffs, or other ornamental articles for dress or furniture, to imitate such articles made of lace or embroidery.

2125. J. L. Field, Colton Haverthwaite, near Newton-in-Cartmel, Lancashire—Imp. in the construction of armour plates and in their application to ships and batteries.

Dated 27th August, 1861.

2132. E. Peltier, Paris—Imp. in the manufacture of metallic boxes, and in machinery employed therein.

Dated 31st August, 1861.

2183. G. F. Goransson, Gefle, Sweden—Imp. in the manufacture of tyres for railway wheels, and in the apparatus employed therein, part of the said imp. being applicable to the consolidating or rendering homogeneous iron and steel for other purposes.

Dated 2nd September, 1861.

2188. J. Watson, Glasgow—Imp. in furnaces.

Dated 5th September, 1861.

2214. W. Patey, junior, Lombard-street, and J. Richardson, Brewer-street, Clerkenwell—Imp. in the manufacture of shaving brushes.

2215. T. Scott, Newcastle—Imp. in apparatus for utilizing the surplus momentum of railway trains and other moving bodies, and the waste and surplus power of locomotive and other engines.

Dated 6th September, 1861.

2226. W. Allott and J. Thelwall, Hull—Imp. in the manufacture of wheel tyres, hoops, and other similar articles.
2227. W. Allott and T. Thelwall, Hull—Imp. in the manufacture of crank shafts and crank axles, and other similar articles.

Dated 13th September, 1861.

2274. W. H. Delamare, 14, Clarence-place, Hackney-road—An improved machine for purifying and peeling corn.
2276. R. Smith, Weymouth-cottage, Hornsey, B. Brookes, 2, Albert-terrace, York-road, King's-cross, and J. Smith, 2, Oak-villas, Wood-green, Tottenham—Imp. in the construction of roof and other lights.
2277. G. C. Haseler, 19, Victoria-street, Birmingham—Imp. in lockets.
2278. R. Fell, Kingsland—Imp. in compressing and rarefying atmospheric air, with machinery for applying the same to obtain a motive power, part of which is applicable for cooking purposes.
2284. W. E. Newton, 66, Chancery-lane—Imp. in guns. (A com.)

Dated 14th September, 1861.

2286. J. A. Knight, 4, Symonds-inn, Chancery-lane—An improved apparatus for rendering fatty or oleaginous matter, and delivering the same. (A com.)
2288. R. Waller, 50, Baker-street, Portman-square—Imp. in machinery and apparatus for manufacturing and refining cane juice and other saccharine substances.
2289. W. Wheatsone, 20, Conduit-street, St. George's, Hanover-square—Imp. in concertinas and other musical instruments, the tones of which are produced from the vibration of springs.
2290. J. Lea, Widnes Dock, near Warrington—Imp. in self acting signals for railways.
2294. A. Green and W. H. Glover, Stourbridge—Imp. in the manufacture of vice boxes.
2296. G. Hawksley, Three Mill-lane, Bromley—Imp. in traction and locomotive engines.

Dated 16th September, 1861.

2300. S. Horsley and E. H. Jones, Liverpool—Imp. in apparatus for cleaning and polishing boots, shoes, and other coverings for the feet, partly applicable for cleaning plate and other articles of domestic use.
2302. W. E. Gedge, 11, Wellington-street, Strand—Improved apparatus for drying grain. (A com.)
2304. T. Meriton, Second Berrard Strasse, Saint Pauli, Hamburgh—Imp. in steering apparatus.
2310. R. A. Brooman, 166, Fleet-street—Imp. in apparatuses for stretching, supporting, and uniting telegraph wires. (A com.)

Dated 17th September, 1861.

2314. B. Samuelson, Banbury—Imp. in harvesting machines.
2320. T. Statham, Salford, and W. Statham, Openshaw, Lancashire—Certain imp. in machinery or apparatus for mowing and reaping.
2322. A. H. Bailey, Boston, U.S.—An improved system of combination types, and an improved case for containing the same.

Dated 18th September, 1861.

2325. W. Cory, jun., Coal Exchange—Imp. in vessels and machinery for unloading colliers and other vessels containing coals.
2326. E. A. Cowper, 35A, Great George-street, Westminster—Imp. in apparatus for freeing gases from dust and other particles of matter floating therein, and for causing vapours or gases to be absorbed by liquids.
2327. H. Wickens, 4, Tokenhouse-yard—Imp. in reaping and mowing machines. (A com.)
2328. E. Partington, Heap-bridge, Lancashire—Certain imp. in machinery or apparatus employed in the manufacture of paper.
2329. A. J. Beer, Canterbury—Imp. in the valves of steam and other motive engines.
2330. G. Ferry, Hoxton—An improved anchor.
2331. E. Suckow and E. Habel, Manchester—Imp. in machinery or apparatus for opening and cleaning cotton and other fibrous materials.
2332. J. Gurman, Onslow-road, Southampton—Imp. in the fittings and method of hanging window sashes to facilitate their removal for cleaning and other purposes.

Dated 19th September, 1861.

2345. S. Hawksworth, Doncaster—Imp. in the manufacture of floor cloth and in ornamenting other surfaces.
2347. R. P. P. Dagron, Paris—An improved microscope to be used for exhibiting photographic views and productions.

Dated 20th September, 1861.

2349. T. M. Gladstone, Parliament-street, Westminster—An imp. in the construction and form of anchors.
2353. C. Davidson, Yalding, Kent—Imp. in thrashing machines.
2357. W. G. Creamer, Woburn-place—Imp. in railway brakes, and in apparatus for actuating the same.
2359. F. W. Wymer, 7, St. Ann's-row, Newcastle-on-Tyne—Imp. in apparatus used in sounding the holds of ships or vessels.

Dated 21st September, 1861.

2361. L. R. Bodmer, 2, Thavies-inn, Holborn—Imp. in gaseliers and in ventilating apparatus connected therewith.
2365. A. W. Stableford, Oldbury, Worcestershire—Imp. in the manufacture of wheels, and in securing tyres on or to wheels.

Dated 23rd September, 1861.

2369. J. H. Duley, Northampton—An imp. in the manufacture of axle boxes and bushes.
2371. H. Plantrou, jun., 15, Passage des Petites Ecuries, Paris—Imp. in washing and scouring wools by the introduction of air into the water, using an aeriform washing apparatus.
2373. H. Brinsmead, Ipswich—Imp. in apparatus for raising and stacking straw and other agricultural produce.
2375. A. A. Hely, Forest Hill, Surrey—Imp. in the construction of portable fire-arms.

Dated 24th September, 1861.

2379. W. E. Wiley, Great Hampton-street, Birmingham—Imp. in pens and penholders.
2381. G. J. Gladstone, Blackwall—Imp. in apparatus for disengaging boats.
2383. C. Watt, Graham-street, and C. J. Watt, Lorrimore-street, Walworth, and T. S. Haviside, Cornhill—An improved mode or method of bleaching palm oil.
2385. J. Cottrill, Studley, Warwickshire—An imp. or imps. in the manufacture of certain descriptions of needles.

Dated 25th September, 1861.

2389. J. Musgrave, Bolton-le-Moors—Certain imp. in the application of steam power.
2391. H. Purnell, Glasgow—Imp. in constructing and arranging warming apparatus.
2393. W. T. Crane and T. J. Ellis, Liverpool-road—Improved means of applying breaks to omnibuses and other four-wheeled carriages.
2395. A. V. Newton, 66, Chancery-lane—Imp. in the construction of and mode of working telegraphic apparatus. (A com.)
2397. J. Vaughan, Middlesbrough, Yorkshire—Imp. in treating gas produced by blast furnaces in its passage from the blast furnaces to other furnaces, stoves, boilers, or other heating apparatus where gas may be employed.

Inventions with Complete Specifications Filed.

2387. J. Banks, 19, Salisbury-street, Adelphi—Imp. in electro-magnetic telegraph printing apparatus or marking instruments, and the instruments or apparatus to be used in connection therewith.—25th September, 1861.
2439. H. Hickman, Birmingham—An imp. or imps. in protecting the locks or sights of fire-arms.—30th September, 1861.

Patents Sealed.

[*From Gazette, October 4th*, 1861.]

October 3rd.

734. W. T. Henley.
825. J. G. N. Alleyne.
829. R. A. Brooman.
831. W. H. McNary.
837. C. Burn.
841. R. B. Greenwood.
846. J. Dunn.
847. J. Hutson.
855. W. Smith.
859. J. Clark.
860. J. Walker and J. Barnes.
864. R. A. Brooman.
865. G. Davies.
867. H. G. Prossor.
870. W. H. Phillips.
872. J. Higgins and T. S. Whitworth.
874. W. Wood.
877. F. Ransome.
902. T. Carr.
917. C. D. Abel.
928. S. Ridge.
934. C. Fletcher.
943. W. A. Dixon.
969. W. Grove.
982. W. Clark.
1019. C. Stevens.
1038. R. Gray.
1160. J. Nadal.
1249. H. Gilbee.
1324. W. Kay and I. Kay.
1812. G. Coles, J. A. Jaques, and J. A. Fanshawe.
1825. J. H. Johnson.
1961. D. Miles.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, October 4th*, 1861.]

September 30th.

2174. J. Wright.
2279. H. Parker.

October 1st.

2200. S. Stimpson.
2408. B. Foster and P. Smith.
2486. B. D. Webster and J. Horsfall.

October 2nd.

2192. J. Rogers.

[*From Gazette, October 8th*, 1861.]

October 3rd.

2223. W. Malam.

Octhber 4th.

2207. A. Bessemer.
2209. W. Menelaus.
2211. J. H. Brown.
2213. J. H. Brown.

October 5th.

2212. G. Hamilton and W. H. Nash.
3229. J. C. Nouveau.
2230. D. Naylor.
2329. J. Whitworth.
3641. D. Evans.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, October 8th*, 1861.]

October 4th.

2140. W. B. Adams.

Journal of the Society of Arts.

FRIDAY, OCTOBER 18, 1861.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £433,500, have been attached to the Deed.

Guarantors who have not received Ivory Passes to the Exhibition Buildings are requested by the Contractors to apply for them to the Secretary of the Society of Arts, John-street, Adelphi, London, W.C.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

The prospect from the top of the Dome scaffold is as extensive as any that can be seen from the summit of the highest buildings in London, having moreover the advantage of a clearer atmosphere than the one which surrounds St. Paul's or the Monument. On the north, are the hills of Highgate and Hampstead, while on the south the view is bounded by the Surrey range, with the Crystal Palace glittering like a jewel in the sunshine. Eastward, the smoke of the City falls like a veil over the distant prospect; even the outlines of St. Paul's Cathedral are indistinct and hazy, while on the edge of the foggy curtain can just be descried the Greenwich observatory. In the middle distance are the Houses of Parliament and the Parks, with glimpses of the river at its different curves; and here and there a tiny thread of white vapour shows where the trains are running on the South-Western and Crystal Palace lines. At one's feet are the buildings and offices of the South Kensington Museum, and the grounds of the Horticultural Society, rich in colour, and, from the immense height, looking like the garden of a Dutch toy.

This lofty position is well adapted for observing the progress of the building, as the eye takes in at a glance the whole of the works below. The nave is now nearly half roofed over, sixteen ribs being in their places; on the one side fourteen windows of the clerestory, and on the other eleven. The galleries on the north and south of the nave are completed and roofed over the entire length, and those on each side of the western transepts are being floored. Six of the clerestory windows in the south-eastern transept have been put in, and four ribs of the north-eastern transept are erected, and that portion covered in. Nearly all the roof of both naves and transepts is covered with felt.

The southern picture gallery, facing the Cromwell-road, is in a very forward state; 24 out of the 28 principals of the roof are fixed, the glazing of the top-lights is progressing rapidly, as well as the laying on of the battens in the interior. Fifteen of the panels in the south front are stuccoed.

A project is on foot to fill these panels with mosaics, pictorial illustrations of "Arts, Science, and Commerce," to be designed by the most eminent artists of the day, and to raise the requisite funds by voluntary contributions. Some decoration, of this or a similar description, will be necessary to give colour to, and break the uniformity of, the Cromwell-road front.

Two of the towers on the eastern side of the Picture Gallery are now rising above the rest of the roof, and go far to break the long straight lines on this side which have hitherto given it a somewhat too monotonous character.

Her Majesty's Commissioners have decided to appropriate to the purposes of the Exhibition, the large strip of ground, on the east, along the Exhibition-road; this will add about 10 per cent. to the space available for exhibiting purposes, and foreign countries have been credited with a proportionate increase in the space previously allotted to them. It is proposed that this additional area shall consist of a large and two smaller open courts, surrounded with arcades, and the further end of it will be converted into a third-class refreshment room. An uncovered space will thus be secured peculiarly adapted for the Exhibition of agricultural appliances and building materials.

The agricultural implement makers, as might be expected from the nature of the objects they exhibite, are anxious to secure a large amount of space. It is understood that upwards of 200,000 feet has been asked for in Class 9 (Agricultural and Horticultural Implements), by about 280 exhibitors, or, on an average, more than 715 square feet to each exhibitor. It is manifest that they must be contented with a very much smaller allotment than this, otherwise they bid fair to transform the whole Exhibition into a show for ploughs and threshing machines. In the Exhibition of 1851 the average allotment to each exhibitor in this class was 100 feet, and in all probability even that amount cannot be afforded on the present occasion. It must be taken into consideration that Agricultural exhibitions are held annually in all parts of the country, where the makers have every facility for displaying their latest improvements. It should be their policy on the present occasion to produce only those

articles which are best suited for a foreign market, or which are from novelty of invention or ingenuity of construction, of great importance to the country at large.

The following arrangements have been made since the last announcement:—

Ceylon.

It has been intimated to Her Majesty's Commissioners that Mr. E. R. Power, late of the Civil Service, has been appointed Commissioner for the Island of Ceylon.

The Argentine Confederation.

The following gentlemen have been appointed to represent this Republic on the occasion of the opening of the Exhibition:—Mr. Marmaduke Blake Sampson, Mr. John Fair, and Mr. W. Wheelwright.

Brazil.

Her Majesty's Commissioners for the Exhibition of 1862 have received an intimation that active steps are being taken by the Government of this kingdom in furtherance of the exhibition of the produce of that empire. An exhibition of raw produce and manufactures will be shortly held in the capital of each province, and a general exhibition of the choicest specimens from their provincial gatherings will take place at Rio de Janeiro, in the month of December next. From the different articles there contributed from all parts of the empire, a still further selection will be made, by a Commisssion appointed for the purpose, and will be transmitted to London.

Belgium.

Messrs. Delpierre and De Grelle have been appointed joint Belgian Commissioners in London.

THE BRITISH COLONIES AND THE INTERNATIONAL EXHIBITION.

By P. L. Simmonds.

No. VI.—The Australian Colonies.

Since the last Exhibition two important districts of the old colony of New South Wales have been separated from it and formed into independent colonies, namely, the districts of Port Phillip and Moreton Bay.

Victoria.

Although Port Phillip was detached from New South Wales in 1850, yet it had scarcely been constituted into an independent colony, under the name of Victoria, at the time the Exhibition of 1851 originated. From a population of 77,000 souls, it has risen now to upwards of 541,000, and it will make a magnificent display of products and manufactures. I proceed to give a retrospect of the course of proceedings that has been taken in that leading colony, and what they propose to exhibit.

In January the Governor, Sir Henry Barkly, K.C.B., issued a Commission to certain gentlemen, authorising them to take steps for a local Exhibition during the present year, and for the transmission of such articles as might be selected as worthy to be exhibited at the London Exposition. The sum of £5,000 was also voted by the legislature towards the necessary expenses. His Excellency expressed his readiness to co-operate in every possible way for facilitating the important object in view. The Commissioners appointed in the colony were Sir Redmond Barry, Knt., one of the Judges of the Supreme Court, the Honourables Sir Francis Murphy, Knt., Speaker of the Legislative Assembly, J. H. Brooke, President of the Board of Land and Works, Sir J. F. Palmer, Knt., President of the Legislative Council, Richard Heales, Chief Secretary of the Colony, W. C. Haines, John O'Shanessy, C. H. Ebden, Charles G. Duffy, John B. Humffray, Commissioner of Mines, John Macadam, Esq., M.D., Government Analytical Chemist, Member of the Legislative Assembly, Frederick McCoy, Esq., F.G.S., Professor of Natural Science in the University of Melbourne, A. R. C. Selwyn, Esq., Government Geologist, Frederick Mueller, Esq., M.D., Government Botanist, Richard Eades, Esq., B.M., C. E. Bright, Esq., and R. McDougall, Esq. Dr. Macadam was named as Hon. Sec., and the Commission having been gazetted, early in February proceeded to work. On the 2nd February a circular was issued, signed by the President, Sir Redmond Barry, from which I shall make a few extracts:—

"In order that this undertaking may be attended with the fullest measure of success, and that the numerous, varied, ample, and important resources of this fertile territory may be adequately represented in the approaching competition of nations, the Commissioners call upon the people of Victoria in general to give them a ready and willing assistance. To those engaged in the different branches of industry they more particularly appeal, and earnestly request that they will exert themselves so that a collection of objects worthy of the country and of the great occasion may be supplied.

"Preliminary to the Exhibition in London, an Exhibition will be held in Melbourne, in or about the month of October. No objects not presented at the latter will be transmitted to London, unless exceptional circumstances, such as recent discovery, capture, production, or completion intervene, to prevent their being so presented.

"With respect to raw materials, the leading elements of merit will be—utility, beauty, perfection, facility of attainment or production, cheapness, a universal adaptation to all markets, or a special fitness to meet a particular want of a more limited character.

"With regard to manufactured articles, excellence of quality of materials, strength, and neatness of workmanship, durability, cheapness, and economic value as a commodity for exportation, or domestic consumption or use. With reference to those which claim attention as the result of invention or mechanical ingenuity, original contrivance or commendable novelty in the application, combination, or economy of power, or of manufacturing process, adaptation of material, usefulness, convenience, strength, finish, and suitableness for accomplishment of the intended purpose; while in determining on the superiority of productions of the fine arts, a judgment will be formed upon the acknowledged rules of discrimination and taste.

"The objects to be exhibited in Melbourne have been ranged under seven leading classes, agricultural products (vegetable and animal); horticultural products; mineral products; machinery; instruments, tools, &c.; animal products, and the manufactures and processes connected with each; and, lastly, miscellaneous. These classes include all the chief products of the country, and admit of easy expansion and re-arrangement to meet the classification required in London. They have been distributed into sections, which are sub-divided into minor groups, to be themselves again separated into more particular enumeration of articles. The expectations respecting the forthcoming Victorian display are in proportion to the wealth, and to the opportunities of cultivating in security the arts of peace enjoyed by those who inhabit this favoured colony. These expectations are not likely to be disappointed."

The First Report of the Exhibition Commissioners for Victoria, dated 12th April, presented to both Houses of Parliament in the colony by His Excellency's command, is a long and elaborate document, and there are several points mentioned therein well worthy of notice. Thus the Commissioners state:—

"We have taken steps to cause a complete collection of the indigenous timber of this country to be made, and it is hoped that in addition to the numerous descriptions of valuable wood which may thus be brought under the attention of the public, a knowledge of their properties, and distinctive and relative value for constructive purposes may be attained.

"As it would be useless to transmit actual specimens of the fruits and vegetables produced here in a state fit for

exhibition in England, models, in gypsum and other material, of the finest productions of our gardens, orchards, and vineyards, are being made.

"The committee appointed to superintend the department of agricultural products have placed themselves in direct communication with the various agricultural societies established in different parts of the country, and have received already in many quarters promises of such support as may insure a full representation of that important branch of our industrial resources. Similar correspondence has been opened with many of the most successful breeders of sheep, inviting them to pay particular attention to the selection and care of the finest woolled of their flocks, and to send parcels or cabinets of the most excellent fleeces. If these expectations be realised, the Commissioners will have it in their power to send to Europe a sufficient quantity of wool of the highest class, to enable them to have cloths and fabrics of the most delicate texture made, in the most celebrated manufactories of England and the continent of Europe. Some of the latter being illustrated with patterns and designs, including some of the most graceful and becoming flowers of the country, an additional interest may be given to them thereby.

"With the hope of being able to procure the best collection of specimens of gold, and at the same time to economise the resources placed at our disposal we have addressed ourselves to the different banks and requested their valuable co-operation. If the arrangements in contemplation can be satisfactorily carried out, we expect that we may be allowed to make selections from time to time, from the large quantity of the precious metal purchased by them, of specimens possessing peculiar attractions by reason of size, richness, or on account of the ore being associated in an unusual manner with other mineral. If so permitted these can be sent to England for exhibition and sold when the object in view is attained, a reasonable compensation being paid for the use of them. It is apparent that the views of the Commissioners in this respect would be largely assisted if your Excellency and your advisers would be pleased to sanction the remittance of funds for emigration, or other public purposes, to be made in crude gold, which after it has been exhibited would be disposed of in London on the public account.

"In pursuing these inquiries it has appeared to us that it is highly desirable to bring prominently before those who will congregate in London, the results of the intellectual and scientific as well as of the manual and manufacturing industry of the people of Victoria. With a view of illustrating what has been done in this direction, it has been considered advisable to submit a recommendation to your Excellency that the patents recorded in the office of the Registrar-General be printed; that a physical atlas of Victoria be prepared and printed. Each suggestion, standing as it does on a different footing, can be supported on different grounds. The enlightened experience of modern times shows that it is now considered by the government of every civilised country to be its duty to inform the public of the progress made in intellectual development, of the fruits of which it has constituted itself the depositary and custodian. This has been in some degree accomplished in this country already by the publication in the *Government Gazette* of the notices required to be given by persons about to apply for patents, and by the reports submitted to your Excllency, which you are pleased to command shall be laid from time to time before Parliament, showing in detail the labours of gentlemen engaged in the scientific departments of the public service. These reports would reflect credit and honour on any country, but at present they circulate but little, if at all, beyond the precincts of the Parliament yard.

"When it is borne in mind that these departments are supported at great expense to the country, are presided over by men of admitted ability and reputation, that in addition to the valuable material work performed in each, a large quantity of scientific work of the highest order in its class is both directly and incidentally added; it is obvious that there must be a loss to the community at large, and that it may prove (if it be not so already) dispiriting to the gentlemen engaged, if more ample means of appreciating their labours are not given. The patents have now accumulated until they have filled seven large volumes, furnishing material (if the whole were printed) for five octavos of the ordinary size.

"Notwithstanding the great care taken by the Registrar-General in arranging them with as much skill and solicitude for their protection as the very difficult circumstances with which he has to contend will allow, they are virtually unknown to all, except those immediately interested in the subjects of which they treat.

"To publish all at full length, with the drawings of the size of the originals, would be too costly a project to be undertaken now; and even were the means at the disposal of Her Majesty's Government ample for the purpose, it is a course which we would not recommend. However, it is manifest that, whether it be deemed expedient to publish them in extenso or in an abridged form, if the publication be deferred for a very few years longer the expense of publishing, what may be considered sufficient, will have swelled to an amount which will effectually deter any ministry from giving their sanction to the attempt.

"It is however possible to accomplish what is within the limits of reasonable outlay, viz :—

(*a*.) By eliminating from the mass all such patents as have been taken out originally in Great Britain aud in foreign countries and merely registered here, and selecting only those which claim privilege as the invention of persons resident in Victoria.

(*b*.) Excluding from the letter press all prefatory matter and operative words of grant, printing only the descriptive parts and notification of claim of invention.

(*c*.) Representing the illustrative drawings of a uniform size, and instead of adopting an expensive mode of drawing by hand, in all cases where practicable using the process of photo-lithography as applied in the Surveyor-General's office.

"If such a course of proceeding were adopted under careful and conscientious supervision, the portion which it may be considered incumbent on the Government of the country to provide for, might be executed at a moderate outlay; and if the whole of the undertaking were, upon estimate and computation, held to be too expensive to be completed this year, two volumes, one containing the last and one of any of the preceding year's patents might be undertaken, and the remainder brought out yearly in a similar manner until the arrears were brought up, when those deposited after that time might appear in annual continuation of the series.

"The government printer has been so good as to supply an estimate of the expense of publishing the whole, the illustrations, 280 in number, being performed by the process of tracing, transfer, and lithography as near as possible in the style of the Illustrated Catalogue of British Patents. This, for 1,000 copies, amounts to the sum of £2,500, independent of printing; and with the means at his disposal the whole of the work (even were it advisable to undertake it) could not be performed in time. The Surveyor-General has also had the goodness to cause an estimate to be made of the cost of carrying out the project on a similar style by tracing, transfer, and photo-lithography, and for a like number of impressions fixes the sum at £1,284. If, as before remarked, a portion only of the work were undertaken now, funds sufficient might be forthcoming without any undue pressure on the revenue, or interference with the execution of any other necessary work; while it is to be expected that something might accrue by way of return for the outlay by sale of the volumes or of copies of individual patents.

"The publication of the Physical Atlas commands, as it appears to us, still greater attention.

(*a*.) The materials for its construction exist in the elaborate productions already in the offices of the Pa-

leontologist, Board of Science, Director of National Museums for recent Zoology, Geologist, Surveyor-General, Botanist, Meteorologist, and Registrar-General.

(*b.*) It would embody in a form authentic and vouched by the authority of Her Majesty's Government, the most interesting particulars connected with the civil, social, and natural history of the country.

(*c.*) It would, as we may venture to expect, repay the outlay, as it would be readily accepted not only as the work for popular information, but as the best, indeed the only work for scientific and geographical instruction for our university, schools, and private families.

(*d.*) It would serve as a standard of reference beyond all doubt or dispute for those desirous of selecting a country as a place of residence or for the investment of capital, or for those who may be engaged in the more comprehensive project of directing immigration to these shores.

"We have the honour to submit the foregoing for your Excellency's consideration. We trust that you will be pleased to approve of the suggestions, and that with that approval and the sanction of your Excellency's advisers, we may be empowered to take immediate steps for the publication of the patents, or such portion as your Excellency may be advised to allow, and as well as for the compilation and publication of the Physical Atlas of Victoria. No estimate has been made of the probable expense of compiling and printing the Physical Atlas. The preliminary outlay might probably be borne by the Board of Education, to be repaid by the presentation to them of a certain number of copies. However, it is confidently expected that the publication would repay the cost."

A late number of the *Melbourne Argus* says:—"For some time apprehensions were entertained that Victoria would not be represented in the great forthcoming Exhibition of 1862 in so worthy a manner as those who are interested in her prosperity and good name could desire. While the Royal Commissioners trusted to circulars and invitations posted on the walls of cities and towns, little was done beyond the immediate efforts of the committee, and as time slipped past, and the contributions were few in number, it became necessary to change the plan of action, and throw new life and vigour into it. The Commissioners then resolved to appoint an agent, whose business it should be to dovote himself to the interests of the colony in furthering the Exhibition, and the appointment was accepted by Mr. J. G. Knight, who has made considerable progress with a personal canvas in Melbourne, and will follow it up by visiting Geelong, Ballarat, Creswick, Maryborough, Castlemaine, Sandhurst, the Ovens, &c.; and in several of the more important of these towns his Honour, Sir Redmond Barry, has given a fillip to the exertions of the local authorities in addresses which he has taken occasion to make on the subject during his late visits on circuit. In response to the personal applications that have been made, numerous applications for space have been sent in, and still more numerous promises have been made."

The applications sent in embrace the following amongst other articles:—Samples of antimony, tin, black sand, lime, wine, wheat, meteorological instruments, quartz, fountains, model of a bridge, pictures, model of railway carriage improvements, &c.; specimens of wood carving, imitations of woods and marbles on wood and glass, kangaroo-skin boots, artistic penmanship and etchings, new reclining and invalid easy chairs, stays, surgical belts, surgical instruments, window blinds, razors and strops, guano, patent fixing bricks with wood keys, new and improved method of attaching joiners' or other work to walls of buildings, &c.; pianoforte, engraving, carved mug, shell and sea-weeds, petrified leaves, ten pictures and vases of Australian seaweeds and other marine productions, specimens of fancy leather goods, colonial made Stilton cheese, carved frame, table, and sideboard, in native woods; screen, with fragmentary illustrations of the processes of engraving, lithography, printing, and photographic art in Victoria; billiard-table, complete; cordials, colonial-made jewellery, gold and silver smiths' work, wood engraving, bonnet boxes, samples of machine-made joiners' work, ale and beer, patent disengaging hook to prevent mining accidents, patent vacuo-amalgamating and indurating machine, liqueurs, vinegar, blacking, patent bitumenised pipes, wool from Chinese sheep, salted meat, wines, peat from Yering, straw bonnets of colonial material, a telescope table, refined and raw sugar, samples of treacle, spirits of wine and rum; colonial-made garments of various kinds, hose, pipe, and other waterproof goods of colonial manufacture; samples of wool; Australasian Atlas, a pen and ink drawing, 9 ft. 3 in. by 6 ft. 3 in.; frame for the above, made from woods of all the colonies; a collection of auriferous quartz and gold specimens; whale-oil; stalactites, from the caves near Portland; precious stones, pumps, gas-fittings, pipes, saddlery, pottery clay, tinware, and stencil-plates, colonial-made rules and scales, engraving and lithography, wicker and wire work, biscuits, colonial herbs, wool flock, bone manure, specimens of dyeing, specimens of wood-turning, wood engraving, patent boots, furniture, samples of seeds of various kinds, model of bush fire-engine, specimens of coppersmiths' work, specimens of brasswork, colonial-made masons' and quarrymen's tools, ornamental printing, sassafras, natural history specimens, cork-cutting, pottery, the great Australian topaz, perforating machine, specimens of manufactures in colonial woods, &c.; case of colonial-made millinery, choice fleeces of wool, &c.; samples of stereotyping and electrotyping, engineers' work, colonial-made saws, soap, candles, &c.; agricultural implements, wire-work, cooperage, colonial-made hames and saddle-trees; colonial drugs, mineral waters, and new chemical preparations; seeds of various kinds, specimens of bent, cut, and blown glass; ornamental work on glass, ornamental writing, &c.; models and apparatus for use of drawing classes; tinware and japanning, jewellers' bent glass cases, convex and bevelled dial glasses; artificial legs, arms, &c.; chasing and embossing, chased gold and silver work, castings, woolpress, manufactured tobacco and snuffs, mirrors, ovens, colonial-made lead piping, taps, new chemical compounds and preparations, colonial-made stringed musical instruments of various kinds; flour and grain; limestone specimens; hats; music published in Victoria; microscopic slides of colonial subjects; bookbinding, model of amalgamating machine, and model of bridge; metal buttons, &c.; colonial fishing rods, &c.; lithographic printing, plain and printed paper bags, rolled iron, in bars of various sizes; railway carriages, samples of machine wrought timber, &c.; a carriage; preserved and salted meats; a water-engine; books published in Victoria, bookbinding, cutlery, gas-fittings, Myall-wood pipes, model of puddling machine, prepared leather; hydraulic machine, made piping, photographic apparatus; machine ground spices, &c.; dressed leather and skins, &c.; machine-made joiners' work; writing cases, &c., in leather; sample of a new cement, patent gold amalgamator, new hydraulic machine, a sampling machine, hydraulic machine—made metal work, corrugated iron, &c.; horse-work and chaff cutting machine, maize and corn crusher, &c.; agricultural machinery; a tent of peculiar construction; colonial-made rifle, new bullet moulds; skins, &c.; specimens of blinds; oatmeal, and maizemeal; model of moveable staging used in the erection of the Moorabool Viaduct; specimens of building and of cabinet woods, specimens and models of patented machinery, &c., minerals and ores; seeds and fruits; preserved fish, oils, &c.; ornamental work on glass, a new description of scales; ink, vinegar, pickles; washing and baking powders; improvements in lamps, samples of tinware; a new description of church clock, basket ware, decorative work, samples of forest timber, and specimens of chromotype photography.

This long list shows that the industry of Victoria is not confined to wool, gold, and grain, and that there are the germs of many branches of industry, which will gain strength with time and the progress of the colony, until they flourish.

Dr. Fredk. Mueller, F.R.S., has made great progress with a collection of samples of the native woods, which, while it will be a most interesting feature in the Exhibition, will probably be productive of permanently beneficial results to the colony.

A raised map of the colony, on a considerable scale, is about to be commenced. It will show the natural features of Victoria—its coast line, mountains, water-courses, plains, forests, roads, railways, &c. The alienated and Crown lands, the gold-fields, &c., will be shown in distinct colours, and thus the visitor to the Exhibition will have before him a miniature Australia—as it is. He will see at a glance the enormous amount of land open for agricultural settlement, and the numerous gold-fields scattered all over the colony; and, possibly, some erroneous ideas on the subject of the water supply will be removed by the long lines of rivers and creeks which the map will display. This feature of the Exhibition, therefore, may of itself be of great service to the cause of immigration.

Another special feature will be a splendid specimen of penmanship, set in a magnificent, peculiar, and appropriate frame, to which three clever colonists are now giving themselves up with devotion. The author of the specimen is Mr. Mackain Meek, formerly a fisherman of Yarmouth; of the frame Mr. Martin, of Clifton-upon-Teme, Worcester (now of Buninyong); and the friend and capitalist who "pays the way" is Mr. Nutt, formerly of Bath, and latterly a successful Bendigo miner, who will himself contribute a very handsome and valuable collection of nuggets, obtained from the Victoria Reef, Epsom and other localities. Mr. Meek discovered his peculiar talent almost by accident, and gave a first public sample of it in his fine Tablet of Victoria, exhibited last year in the bazaar for the benefit of the Lying-in Hospital. That work was admitted to be a remarkable example of penmanship, but it is entirely eclipsed by the Atlas of the Australasian Colonies, on which he is now engaged. This last is nine feet three inches by six feet three inches in size, and has engaged Mr. Meek's undivided attention for the last six months. The great bulk of the work however, is now done, and in six weeks more it will be finished. In the centre, within an elegant scroll, is a sketch of the advantages Australasia presents, and its prospects of becoming great. In the arrangement of the lines great taste is shown, and the fancy displayed in the forms of the letters is rich, varied, and harmonious. At the top is a map of the continent of Australia, and at the bottom one of Victoria. Maps of New South Wales, Queensland, Tasmania, New Zealand, South Australia, and Western Australia, are placed at the sides, all drawn to scale, with the pen, and lettered with remarkable clearness. Views of Melbourne, Sydney, and Auckland, the seal of the Corporation of Melbourne, the arms of His Excellency, and various spirited sketches of colonial birds and animals are disposed in convenient places, and the whole is filled with every variety of information as to the history, progress, natural features, productions, &c., of the various colonies of Australasia. The frame will stand fifteen feet four inches in height, and will be eleven feet in breadth. The design is very handsome. It will exhibit all the styles of architecture introduced between the 10th and the 16th centuries. The material will be of native woods of all kinds, and the effect will be aided by the introduction of silvered and coloured glass. It will show that the hand of the artist—employed at home on some of the best works in England—has not lost its cunning. When the work is ready for exhibition, it will have cost some £500, without reckoning Mr. Meek's own eight months' labour; and it is hoped that all concerned in it will find their reward in the sale of the copies which will be made of it on a reduced scale by photography.

From those who have no manufactures or produce to show, Mr. Knight is obtaining photographs of business premises, which, judiciously arranged, will add to the interest of the compartment; and with models of the public buildings, mining models, inventions, batteries of stamps, quartz specimens, models of fruit, fish, pictures, panorama of the railways, &c., &c., there will be a diversity and peculiarity in the show which Victoria will make in the Exhibition of 1862.

Amongst the numerous articles which it is intended to forward as evidence of the resources of the colony, may be mentioned 25 tons of auriferous quartz, from the Clunes Quartz Mining Company. Models of mining machinery will also, doubtless, fill a very important place amongst the exhibits, and valuable improvements may, perhaps, be suggested by some of the scientific men by whom it is reasonable to suppose they will be examined.

An offer has been made to exhibit a most interesting model, representing life and operations in the gold fields of Ballarat, which took the clever modeller, Mr. Nordstrom, a native of Stockholm, five years in its elaboration, and cost about £3,000. The model is a representation in miniature of every phase of gold digging life, from the surfacer with his pick and pan, to the deep sinker with his costly array of steam engines, pumps, deep shaft, and multitudinous tunnellings, with all the intermediate kinds of working known to the Victorian miner of the present day. The figures are formed of wax, while the tents, hotels, stores, shaft-shanties, windlasses, whims, whips, picks and shovels, steam engine, trees and stumps of trees, gold, quartz, reef, sand, carts and drays, cradles, long toms, and buckets, and all the other things represented, are really and truly but tiny copies of the things in daily use or view, and made of the same materials. The gold, and quartz, and reef, and sand, are real gold and quartz and reef and sand; the trees, stumps, and timber, are real trees, stumps, and timber; and all the tools and implements mentioned are manufactured of veritable wood and iron and tin. The whole affair is extremely accurate, even to the minutest detail, and to the roughness of appearance which a goldfield, and *par excellence* a new rush, presents.

Standing at the upper end of the model we have before us, at the right-hand corner, part of an auriferous range, on the sides and top which a "rush" has taken place, and surfacers and shallow sinkers are busily at work. The face of the hill shows in section the shallow sinkers' shafts and "drives." One digger is seen ascending his shaft, while others are seen in the drives hard at work. One "new chum" is going down upon a pillar or solid bit of ground, while an "old chum" is quietly driving out the washdirt from beneath the pillar. At the foot of the hill is a creek running away down a flat, and having a dam at one place, and lined with diggers of all nations washing with dish or cradle, or long tom, as the case may be; while the flat itself is crowded with diggers of all kinds up to (or down to) the deep lead miner. Leaving these for a while, we move on to the left, and at the corner is the commencement of the "main road," common to all gold fields in the "new rush" portion of their existence. The "Southern Cross Hotel" comes first, with bands of musicians in front; then come the butcher, chemist, general dealer, clothier, gold buyer, smith, grog shanty, cigar shop, and at the lower end the ever-present timber yard, out of which a digger or a shanty-keeper is sallying with some battens on shoulder. Rounding the corner, we come to the model of the engine, engine house, shaft shanty, puddling machine, pumps and sluice-box of the Great Eastern Company, Golden Point Lead, and are now looking up the "flat," and facing the spot from whence we started. The Main Road we have just come down is full of vehicles and passengers. There are a coloured man hawking pies, children with a goat's cart full of cabbages, equestrians, loaded drays, a butcher's flock of sheep, a string of Chinamen with laden bamboos, the gold escort with its outsiders, a Chinaman with a pig, a hawker of newspapers, a hurdy-gurdy girl, a couple of beardies, courtezans, new chum with "bell-topper," black coat on arm and double swag, and divers other figures one meets every day on the goldfields. Looking over the model of

the surface works of the Great Eastern Company, we observe on a heap of mullock a couple of "gents" arm in arm, one of whom is pointing with an umbrella to a "jumpers" dispute and fight—that ever recurring scene at a new rush. Beyond in the flat we see deep lead shafts in all the variety of working and gear. One claim has a whim, another a windlass; some are in the gutter and are baling water and filling up the paddock; while others are in "the reef," and are less troubled with either water or washdirt than their neighbours. At the bottom is a Yankee "prospecting" and thinking to "do" the Britishers. On the right hand a boring party are hard at work, some working the bore, others preparing timber, others getting the iron tubing in order. In a tent hard by a shaft we see a miner drawing on his boots, preparatory to a descent down the shaft. Outside another tent a party are cooking their meal; one has the frying-pan, another beaf steaks, and another loaves of bread. Passing on to the left, we come to another auriferous hill, covered, as is the one already described, with workers, trees, tree stumps, and felled logs; and at the lower edge a water race is led off on "flumming" to a party of washers-up. The face of the hill, cut in section, shows the shallow sinking drives again, with the diggers driving out the washdirt; one fossicking, another smoking, and so forth, in all postures, and at all kinds of work; while on the hill top, a digger is hastening with a bag of washdirt to the creek. Rounding the corner to our left, we come to the creek side, where, besides the usual washing operations, we see the fight already alluded to, and towards which the diggers are seen approaching from all directions, a "ring" being already formed. In a tent alongside are a party dividing their gold, and in another further off is a digger indulging in his *siesta* upon a stretcher, or reading a book, in an attitude suggestive of a full disposition to "take it easy." Passing on, we come to the reverse side of the hill we started from at the commencement of our tour. On the top are some quartz miners at work, while the slope of the range is covered with the usual arboriferous vegetation of the Australian goldfield ranges, and interspersed therewith figures of birds, animals, and natives, with mimi, boomerang, dogs, and all the other paraphernalia of the aborigine.

Having completed our view of the goldfield, we now turn to a model of the shaft of the Great Eastern Company, Gold Point, shewing the shaft, its mode of timbering, the strata and rock through which it was sunk, and the drives in the reef and gutter. This is a very ingenious and truthful picture of the works of one of the deep lead companies. The shafts and drives are on a scale of half-an-inch to the foot, but the strata and rock are on a quarter-inch scale, the depth of the shaft—viz., 228 feet to the reef, and thence 52 feet further to the gutter—being too great to admit of convenient representation on the larger scale.

SOUTH STAFFORDSHIRE UNION FOR THE PROMOTION OF ADULT EDUCATION AND EVENING SCHOOLS.

The second anniversary of this society was held on the 30th September, at Dudley. The proceedings of the day were commenced by a meeting of the Local Board and Executive Committee, held at the School of Art, when the report was adopted, and the members of the Executive Committee appointed for the ensuing year.

The report commenced by stating that the association was originally established with the view of affording mutual advice and assistance to all Institutions joining the Union, and giving their younger members in particular an incentive to more systematic study in classes and otherwise, so that eventually they might be brought up to the standard of the Examinations of the Society of Arts. The scheme of providing organising masters for giving regular class instruction to Mechanics' and such Institutions (as carried out in East Lancashire by Sir J. K. Shuttleworth) was beginning to bear valuable fruit; and it was resolved that the same scheme should be tried in South Staffordshire. Mr. Jones was accordingly appointed to the office; and since July, 1860, he had been employed in visiting Institutions and their chief promoters, organising and instructing classes connected therewith, and in furthering in other ways the general objects undertaken from time to time by the Union. The committee would not, however, disguise their disappointment that up to the present time their scheme had not met with that hearty response which was naturally expected from the Institutions of the neighbourhood; and they regretted that the burden of paying the reasonable expenses of a thoroughly competent agent for carrying on the scheme was now so great, that unless the funds of the Union soon received some augmentation they would be obliged to entertain the question whether the services of an organising master must not be withdrawn from the Union. At the first anniversary of the Union, the committee reported that eleven of the Institutions of the neighbourhood had joined the Union, and since that period one of these Institutions (the Christian Young Men's Association at Brierly-hill) had ceased to exist; but five others had signified their wish to join; thus making the total number 15. The Institutions already in connection with the Union were as follow:—Wolverhampton, Working Men's College; Smethwick, Messrs. Chance's Library; Bilston, Mechanics' Institution; Stourbridge, the Associated Institute; Brierley Hill, the Mechanics' Institute; Brierley Hill, the Christian Young Men's Association; Willenhall, Literary and Mechanics' Institute; Wednesbury, Mechanics' Institute; Wolverhampton, Christian Young Men's Association; Walsall, Working Man's College; Cradley, Night School. Those admitted during the past year were the Dudley Mechanics' Institute, Stourbridge Church of England Association, Handsworth St. Michael's Young Men's Instruction Society, Darlaston Mechanics' Institute, Dudley Educational Institute. The night schools at Amblecote, Walsall, Corngreaves, and Smethwick (Messrs. Chances's) had intimated their wish to join the Union, and would be formally received that evening. Night schools contributed 5s. annually. The Committee rejoiced to find that class instruction in connection with Institutions was on the increase, and there was a more frequent recognition of the importance of regular class instruction, and more frequent attempts to carry out plans for its development and successful issue; but still great difficulties cramped the efforts of the friends of the movement in most places, arising from a want of proper rooms and furniture. In nearly all places there was a deficiency of teaching power, as well as a lack of funds for the payment of such talent as the place might offer. At Wolverhampton, Stourbridge, Smethwick, and Dudley, there were facilities for carrying out class-teaching, and the last-named place would soon have an Institution that would probably serve as a model for the surrounding district. At Willenhall and Brierley Hill the Institutions had collected funds towards suitable buildings. Many institutions and night-schools had not, however, yet joined the Union, but it was hoped they would do so; they would thus draw to themselves a share of that more public consideration and support which their present limited but most useful range of operations prevented them from claiming. With referenee to the Local Examinations, the result of the issuing of the programme of subjects in which schools could be examined was that candidates presented themselves from Wednesbury, Walsall, Amblecote, Dudley, Smethwick, Wolverhampton, Cradley, Stourbridge, and Corngreaves,; and the examiners had awarded 61 certificates—17 of the first class and 44 of the second. Mr. J. N. Langley, of Wolverhampton, had undertaken the duties of Secretary to the Sub-Committee on night schools, and would be happy to give any information on the subject under his supervision. The programme of the next examination would be immediately issued. On the 18th 19th, and 20th of March last, the Local Board of the Association examined 62

candidates for admission to the final Examination of the Society of Arts. Of these, 48 came up to the required standard, and obtained "passes;" and on the evenings of the 30th April, 1st, 2nd, and 3rd May, 44 of them, together with 12 others who had gained certificates in previous years, and wished to raise their position, were examined in the several centres of the district, in accordance with the programme of the Society of Arts. In June the Society declared the awards, when out of the 56 candidates from South Staffordshire, 47 were found to have been awarded 67 certificates—19 of which were of the first class; 18 of the second; and thirty of the third; 9 only of the 56 having failed in their examination. The general result of the examination of this year compared with last showed that a very satisfactory advance had been made, as last year only four Institutions in "union" sent in 24 candidates, who obtained 27 certificates; and the Institutions not in "union" at that time sent in three candidates, who obtained their certificates—making five Institutions, 27 candidates, and 30 certificates; this year eleven Institutions had sent candidates who had obtained 67 certificates. Again, South Staffordshire occupied a good position in comparison with the whole of England. After giving the names of various successful candidates, the report went on to state that last year two of the prizes awarded by the Society of Arts (the first and second for Logic) fell to candidates from South Staffordshire. This year four had been obtained. The average age of candidates last year was 19⅗ years; this year it was 20⅗ nearly. Last year six subjects only were taken up; this year the number was thirteen; nearly one-half the total number in which they can be examined. The committee regretted that the low state of their finances prevented them giving prizes to those young persons whose names were placed in order of merit to the first and second grades respectively; but next year they hoped to be able to do so. While giving prominence to class instruction the committee did not wish to be unmindful of the good results of lectures and readings as means of instruction and recreation, but there were many difficulties in the way of carrying out this project, arising from the want of sufficient funds to employ lecturers, and also from the want of a responsive audience. Still, the committee hoped in a short time to be able to lay before the Institutions connected with the Union a list of lectures by known lecturers, and they propose to fix the charge to Institutions at ten shillings and sixpence, and to night schools at five shillings each lecture. Travelling expenses were, however, to be paid, in addition. They intended, with the money thus realised, after their present liabilities were discharged, to furnish Institutions with such apparatus, diagrams, &c., as might subserve such educational purposes as were contemplated by them. The committee appealed to the clergymen and gentry of the neighbourhood for assistance towards this object. A series of lectures upon English history (with pictorial illustrations), chemistry of common life, illustrative of sanitary arrangements, or good readings of the great authors of our country, were much desired, and would be thankfully accepted. After alluding to the Night School Conference held in Birmingham, and the papers there read, the report referred to the finances of the Union, regretting that they were in such an unsatisfactory state. At the last meeting there was £73 due to the treasurer; and although that amount had been somewhat diminished by the donations and subscriptions of the quarter, still the quarter's accounts now falling due would leave a still larger balance due to the treasurer. The document next alluded to the fact that besides the operations now being carried on the committee were desirous of affording pecuniary assistance and suitable teachers to the poor outlying districts; to certify competent persons as assistant teachers, or teachers of special subjects; to offer rewards for the study of special subjects, especially in the natural history of that locality; to publish annually a list of such books as might be thought desirable additions to libraries; to provide small lending libraries for poor districts; and, lastly, to collect and arrange for periodical loan a museum of art and natural history. The report concluded by thanking the Society of Arts for the assistance they had rendered to the Union.

The appointment of the committee and officers for the ensuing year closed the business of the meeting.

At the conclusion of the committee meeting, the members of the union and other gentlemen assembled at dinner in the Hotel Assembly Room. Lord Lyttelton presided, and there were also present the Rev. J. P. Norris and the Rev. H. R. Sandford (Her Majesty's Inspectors of Schools), the Revds. J. H. Sharwood, J. H. Thompson, and J. Whewell; Messrs. Thomas Bagnall, Henry Chance, Edward Chance, J. N. Langley, G. Bidlake, S. Hill (Chillington), Taylor (Stourbridge), J. Stokes (Dudley), Talbot (secretary), and Jones (organising secretary). At the conclusion of the dinner the company adjourned to the National School-room connected with St. Thomas's Church, where at seven o'clock a public meeting was held. In addition to the gentlemen above referred to, there were also present Rev. Dr. Browne (incumbent), Rev. Dr. Gordon, Rev. — Thompson (Cradley), Rev. Mr. Shephard, Spon-lane, and Rev. G. Lewis (Dudley). Lord Lyttelton occupied the chair, and, in opening the proceedings, remarked that they were assembled that evening to celebrate the second anniversary of a union for the promotion of adult education in the district, especially and primarily with a view to the examinations started by the Society of Arts. The union also contemplated in a subordinate way the assistance of night schools, the members of which could not reach so high a level as that contemplated in the other and primary objects of the Union. His lordship then called upon the secretary (Mr. Talbot) to read the report, an abstract of which is given above. The President of the Union then addressed the meeting. After speaking in eulogistic terms of the secretary (Mr. Talbot), his lordship said he wished to follow the cheerful tone which upon the whole marked the report they had just heard read, for when they bore in mind the primary objects of that Institution, they would agree with him there was great reason for congratulation upon what had been done.

The Rev. J. P. Norris next addressed the meeting, and was followed by the Rev. Mr. Thompson, of Cradley, who gave an encouraging account of the labours of the examiners; by the organising master, Mr. Jones, who gave a gratifying report of the night schools; by the Rev. Mr. Sharwood, of Walsall, who proposed a resolution recognising the usefulness of such Institutions; by the Rev. G. Lewis, and by Mr. J. Langley.

During the evening the various prizes were distributed by the President to the successful candidates, and a vote of thanks to his Lordship terminated the proceedings.

UNSINKABLE AND INCOMBUSTIBLE SHIPS.

The *Briton*, new screw steamer, destined for the Cape mail service, and now lying in the river off Deptford, is the first specimen of a novel system of shipbuilding, invented by Mr. Charles Lungley, who claims for his invention—which is patented—two great advantages, viz., safety from destruction by water, and to a great extent security against fire. Each deck of the vessel is distinct from the others, having no communication with them, but having its separate hatchway or entrance from the upper deck; the object of this arrangement being, that whatever injury may be incurred to either one or even to two of these decks or stories, the other or others will float. Thus, for instance, should the lower or keel deck be knocked away the two upper decks will float the ship; or should, either from a collision, the starting of a plate under the water line, or from a shot or a broadside penetrating the sheathing, one of the intermediate decks let in the water even to the extent of filling the compartment from stem to stern, the buoyant power would still remain, and the vessel would not only float, but be perfectly manageable, the water merely rising up the trunk hatchway of

that particular deck to the level of the water-line outside, allowing full opportunity for a diver to descend, find out the place and extent of the injury, and repair it if capable of repair, after which the water might be pumped out and the ship freed. The same subdivision of decks which affords the security against entire submersion ensures protection against total destruction by fire. In the event of a fire being discovered on either deck the hatchway of that deck would be fastened down, and the supply of air being thus cut off the fire would die out of itself; or if the fire had got too much hold upon the ship to allow of this, then the entire deck in which the conflagration was raging might be filled with water without risk of other inconvenience than that of having to pump it out again. Another advantage of this mode of ship-building is the perfect ventilation it is said to insure to all parts of the vessel. At present the general practice is to have one main hatchway, which communicates from the upper deck to all the several floors on the ship, and which forms the ventilating shaft from each. It is easy to imagine in cases when fever breaks out on board how much the danger is likely to be increased by such an arrangement, or when large numbers of troops or emigrants are berthed below how much the risk of disease is increased by such imperfect ventilation. By Mr. Lungley's plan, each deck has its own ventilating shaft or shafts—for there may be one, two, or more—in the hatchways, which are its means of communication from above. These separate shafts likewise afford facilities for loading and unloading, which will be appreciated in merchant ships. The practice of dividing iron ships into water-tight compartments, with the view of preventing their sinking, has been followed for many years, but the division walls have in all cases been transverse; that is, each deck has been divided by water-tight iron bulk heads into three, four, or more separate rooms or apartments—the impression being that should one or two become by leakage filled with water, there would be buoyancy enough in the others to keep the ship afloat. Experience has unfortunately, however—and the case of the *Connaught* is a prominent instance among many—proved the unsoundness of this theory. The fact is, that when any one of the compartments becomes filled with water, or ships water in any considerable quantity, the vessel is unduly depressed in that particular part, and no longer sails with an even keel. To remedy this it would be necessary to let in a corresponding weight of water in the opposite compartments, which in all probability, even if practicable, would bring the ship down so low in the water that with anything like a sea on she would sink, or the wash from side to side would lay her over upon her broadside; whereas, if she were left with her keel out of the level, she would, as the water gained upon her, go down head or stern foremost, as the case might be. By making the decks themselves the water-tight divisions, the weight of water in case of leakage is equalised over the whole surface of the ship, and the even keel, which is the main element of safety, is preserved, while all danger is localised, and thus proportionately reduced. One thing which strikes the attention of the visitor on board the *Briton* is the perfect isolation of the engine room. Not only is it protected by the water-tight deck division, but longitudinal bulkheads, or iron walls, running fore and aft some feet within the outer shell or sides of the vessel protect it from the chance of injury from without. Thus a fracture in the outside plates occasioned by collision, stranding, or shot, although it might admit the water into the ship, would not affect the engines or the fires. The importance of this arrangement of longitudinal inside walls for the protection of the machinery, especially in ships of war, where it may be carried throughout the vessel, for adding to the stability of the entire structure, seems very great. The vessel is now complete, ready for sea, and in the meanwhile her builder, Mr. Lungley, invites those who take an interest in such subjects to inspect her, and, to a large extent, their invitation has been accepted and acted upon by merchant shipowners, and officers connected with the navy and the merchant service.

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS.

(*Continued from page 771.*)

Republic of St. Domingo.—The republic of Santo Domingo is divided into five provinces, namely:—Compostela de Azua; Santo Domingo de Guzman, containing the capital and seat of Government; Santa Cruz del Seybo; Concepcion de la Vega; Santiago de los Caballeros.

The three first extend along the southern seashore and inland to the central chain of mountains; Concepcion de la Vega stretches along the north-western foot of the mountain chain, comprising that splendid valley which Columbus called the Royal "La Vega Real;" and Santiago de los Caballeros, the remaining territory, occupies the northern seashore. The peninsula of Samana belongs to the jurisdiction of Seybo.

The province of Azua produces mahogany wood, some sugar; and the district of San Juan, belonging to that province, is famed for its grazing grounds; hence horses and cattle are raised there, and hides exported.

Santo Domingo produces mahogany, lignum vitæ, dye-woods, wax and some hides; lately sugar has been exported to some extent.

Seybo yields some mahogany, but principally cattle, the province being famed as standing only inferior to San Juan for its grazing grounds.

La Vega exports principally tobacco, the other articles are only of second importance.

Santiago is equally famed for its cultivation and export of tobacco.

These two latter provinces distinguish themselves for the superior industry of their inhabitants, hence the commerce is comparatively much larger and of greater extent than in the southern provinces, where a great deal of indolence prevails. It is to be regretted that the produce of Santiago and La Vega, which two provinces are known under the name of "El Cibao," have to be transported by a most circuitous road over the mountains to Puerto Plata, the shipping port of El Cibao. Although the direct distance is no more than sixteen miles, upwards of sixty have to be traversed before the produce reaches Porto Plata from Santiago. This road can only be used for horses and beasts of burthen, the highest pass, La Cumbre, is about 2,000 feet above the sea; one will therefore not be surprised to learn that the transport from Santiago to Puerto Plata is higher than the freight from the latter port to Hamburg and Bremen.

Nature has pointed out the great road of traffic for the Cibao, by following the valley of the river Yuna, which opens into the handsome bay of Samana. But the desire of following the customs of their forefathers and want of industry and energy, to say nothing of the requisite capital, render the inhabitants blind to this great advantage.

It is impossible to give a fair estimate of the population of the Dominican Republic. No proper census has been taken for an age. The present government highly exaggerate the number of their citizens. I do not think that the whole population surpasses 150,000.

According to the law of the maritime commerce now in force, the following ports are declared open for import and export in national and foreign vessels:—Santo Domingo, Tortuguero de Azua, Puerto Plata, Samana, and Romana. The port of Monte Christi is open only for exportations.

The coasting trade is reserved to national vessels, but foreign vessels may load in any part of the republic by means of a permit, and by paying half a dollar per ton for a licence. The vessels that load on the coast have, however, to return to one of the open ports in order to clear out.

The foreign ships that arrive at Santo Domingo for the purpose of loading mahogany and other woods enter their vessels at the Custom-house, and proceed then to one or more of the ports and anchoring places along the coast, in the neighbourhood of which the mahogany lies ready

for embarcation. The greater number of these places are not inserted on the charts, and some are of that nature that the vessel can only be loaded with great risk. The consequence has been that a great many vessels have been lost, and the coast of Santo Domingo has become in disrepute with shipowners and insurance companies.

In order to give a general idea of the places where vessels are sent to in order to load mahogany, &c., I published, in 1853, in the *Nautical Magazine*, "remarks on the principal ports and anchoring places along the coast of the Dominican Republic," which memoir has been separately reprinted and has been likewise translated into Spanish. It remains still the only work that gives information to the mariner as regards the safety or danger of the place mentioned in it.

The port charges upon vessels at their entry from abroad are:—

1. For every ton that the vessel measures according to its register one dollar Spanish,* if the vessel belongs to a nation in treaty with the Dominican Republic; if otherwise, one dollar and a half.
2. Lighthouse duty, 6 cents silver per ton.
3. Foreign vessels (as already mentioned) to load on the coast, half a dollar per ton.
4. Anchorage, for every ton, 6 cents silver.
5. Pilotage, when it is required, for every ton, 6 cents silver.
6. Entry, for every ton, 4 cents silver.
7. Duty for the stage on unloading, 2 dollars for every day that use is made of it.
8. Wharfage, 1 per cent. on the total amount of import and export duties.
9. Interpreter's duty, for every vessel from one to 100 tons, 2 dollars. From 101 upwards, 4 dollars.
10. For the maintenance of the telegraph, for every vessel from one ton upwards to 100 tons, 2 dollars; and from 101 tons upwards, 4 dollars Spanish.
11. Health officer, 2 dollars.
12. Watering at the well, 1 dollar per puncheon.

All vessels under twenty tons coming from abroad are only subjected to the following charges, namely:—Tonnage duty; wharfage duty on goods imported or exported; licence for a permit (if a foreign vessel) to load on the coast. These charges must be paid in hard money before the sailing of the vessel.

Men of war, packets or mails, whether under national or foreign flag, vessels that arrive expressly with emigrants, and vessels that by stress of weather put into a port of the republic; further, those that enter and clear in ballast, or enter into port for the repair of damages, provided that that they do not discharge or take in cargo, are exempted from all charges.

The duty upon imports is 25 per cent. according to the value which a commission, consisting of custom-house officers and merchants, have fixed for each of the articles that comprise the general imports. Thus, for example, rice has been fixed in the tariff, or "arancel," at the value of 4 dollars per cwt. (25 per cwt. duty upon which make 1 dollar); ready made shirts of fine linen at 30 dollars per dozen give 25 per cent., hence the duty upon it would be 7½ dollars, &c. The fixed prices are in every instance moderate, and generally under the actual cost price.

All kinds of machinery for husbandry and industry, scientific instruments, books, horses, mules, and all live animals, tiles for roofing houses, military equipments, &c., are free of import duty.

The export duty is moderate, namely:—

	Dollars.	Cents.
Wax, White, per cwt.	1	50
Ditto, Yellow, per cwt.	1	0
Mahogany, Espinillo, Calla, and other ornamental woods, per 1,000 feet	5	0
Campeach, Lignum vitæ, Fustic, per ton	1	0
Hogs, Sheep, and Goats, each	0	50
Hides, each	0	6
Ditto, of Goats, Sheep, and Hogs, per doz.	0	25
Honey, per gallon	0	1
Resin, Guicum, or others, per cwt.	0	50
Tobacco in leaves, per cwt.	0	50

Horses are forbidden to be exported in large numbers. There is also a law existing, but little attended to, that mahogany of a less size than ten inches in breadth is not to be exported. This regulation has, no doubt, for its object to prevent the cutting down of young trees.

These duties, export as well as import, are paid alike under whatsoever flag the vessel that imports and exports the goods may sail, the Dominican not excepted.

The warehousing and bonding system is established by law, and extends to all ports open to the foreign trade. Goods may be warehoused at the Custom-house stores, for the space of sixty days, by paying a duty of 1 per cent. on the amount of the invoice. On the expiration of that term, if they have not been exported, they must be entered for importation, and pay the duty as regulated by the tariff.

Monetary System.—The great obstacle to extensive commercial operations exists in the scarcity of coin and the substitution of an inconvertible paper currency, the credit of which rests upon the public revenue and territorial possessions of the republic.

In 1844, when the Dominican Republic entered into existence, the currency consisted of Haytian paper money guaranteed by that government, which was soon called in and exchanged for Dominican paper, and an additional issue was made of nearly half a million. This paper money was at that time current at the rate of 40 pesos currency for the doubloon of 16 dollars Spanish (equal to £3 6s. 8d.; or a Dominican peso was then equal to 1s. 8d.) New issues followed in subsequent years under the various administrations that succeeded each other, and it may be safely calculated that the amount now afloat is probably twelve millions of pesos.

The political events, internal strifes, invasions of the Haytians, and the large quantity of paper-money afloat, all these circumstances have contributed to depress these assignats; and the doubloon which is taken as normal coin, commanded at some period last year 1,200 pesos, hence a Dominican peso, which in 1844, was worth 1s. 8d., had at that time merely a value of ¾d.

In consequence of the approaching tobacco crop in the Cibao, where a large amount of paper money is requisite to pay the farmers for their produce, the value of the currency has risen, and the doubloon commands now only 800 pesos, or the peso is exactly 1d.

These notes pass freely within the republic in the common transactions of life, but as there is no convertibility attached to them, the merchant who has to make a remittance in cash, has to exchange them within the Republic, often with great disadvantage, for hard money or bills of exchange. Hence the merchant and retailer, are both alike subjected to heavy losses in consequence of their rapid deterioration; and, as the former is obliged to sell on credit, it happens frequently that by the time the amounts are due, the fictitious medium has lost 50 per cent., for which he did not make any allowance when he fixed his prices.

Except, therefore, a more healthy state can be introduced into the financial system, by which the paper issue is rendered convertible, there can scarcely be any inducement to embark large capital for mercantile speculations.

Several attempts have been made by British merchants to endeavour to establish a direct commercial intercourse with Great Britain. They have, however, failed in Santo Domingo, as the exports which could be sent, principally mahogany, lignum vitæ, &c., were not of sufficient value to pay the amount of the imports; and, in order to remit specie, the circulation of the paper-money of a very low value, rendered the operation extremely doubtful.

It is, in some respects, very different in Porto Plato, where several English and German houses are established;

* The silver or Spanish dollar is of the value of 4s. 2d.

for, the principal produce being tobacco, this article possesses a much greater value than mahogany and other woods.

The revenue of the republic depends principally upon the import and export duties.

Every merchant, retailer, or shopkeeper, tradesman, &c., has, moreover, to pay an annual sum for a licence to carry on his occupation. The respective amounts are fixed annually, without difference in the amount, whether the person who applies for a licence is a Dominican or a foreigner. There are no land or house taxes.

The Dominican Republic has no foreign debt; hence the national debts consist in the sum of paper currency which is in circulation within the republic.

The currency consists in notes of 40 pesos, 20 pesos, 10 pesos, 2 pesos, and 1 peso. There is likewise some small coin current made of a kind of composition, 32 of which make 1 peso.

Of foreign silver money there circulate Spanish and American dollars, and smaller coins of that description. French five-franc pieces at 94 cents; English silver money at 4s. 2d. per dollar; likewise Spanish and South American doubloons at 16 dollars. American, English, French, and Dutch gold coins.

The Custom-house weights and liquid measures are the English pound and the imperial gallon.

In wholesale transactions the merchants use French weight; and, for measure, the English yard; but, in retail shops, the Spanish vara, which is 8 per cent. less than the English yard, is invariably employed.

Home Correspondence.

PHOTOGRAPHY AT THE EXHIBITION OF 1862.

Sir,—Perhaps in no art has there been greater progress made, since our last decennial Exhibition, than in that of photography—an art that, by the use of collodion, has risen from a mere toy to a giant power and boundless pleasure—a power that I hope may not be turned against us in 1862. Photographers must be up and stirring if they want to compete with the results I have seen in the northern capitals of Europe, and which, doubtless, are to be found in the south also. I allude to the life-size portraits taken by the action of light, of heroic proportions and artistic worth, reminding one of the best works of such great masters as Rembrandt, Reynolds, Velasquez, and Opie. I know it is the idea here that objects the size of life cannot be done satisfactorily to compete with the works of our artists—a great mistake, that we may find to our cost in next May. If we had nothing to contend with save the miserable heads exposed in one or two of our leading thoroughfares—great faces, or rather "likenessess," without expression, being libels on humanity in general and individuals in particular—we should have little to fear; but such is not the case. From Berlin, Dresden, the Hague, Aix la Chapelle, and Brussels, we shall have first-rate full-length portraits, looking more like grand paintings in sepia, than tarnished silver fixed by a chemical process, independent of the artist's touch as I presume them to be, though some hold otherwise. All I can say, from several at present exhibiting at an Exposition in the Palais du Prince Héréditaire, at Brussels, is, that if touched by artists they are a great credit to their powers, and the result highly satisfactory; but I do not believe nature in this case has required such aid or had it. At Brussels, in the Exposition I name, are several life-sized portraits, remarkable for breadth of effect and artistic treatment; a half length of a man, in a loose coat, with a broad felt hat in his hand; and another of a gentleman reading, on a bed or couch, much foreshortened; also one of the Emperor of the French, I think taken from a small album portrait.

The miniature painters' occupation is nearly gone, and we may perhaps see the second-rate portrait painter also superseded, and the same negative made to print pictures for the walls of town-hall or mansion, or for the album in the lady's boudoir. I am, &c.,

JOHN LEIGHTON.

Regent's Park, October 14th, 1861.

NATIONAL PORTRAIT GALLERY.

Sir,—In the Society's *Journal* of the 14th June last, a correspondent made a strong statement upon the condition of the National Portrait Gallery. He represented the unfit, dark, and miserable appearance of the rooms; the little progress made in the collection; the unworthiness of the greater part of what has been collected; the extravagant cost; and the poor return which the public can derive from it—averaging the charge at 20s. per head upon the few listless visitors, who cast round a disappointed glance and quickly leave.

On a visit to the gallery, all this was confirmed in my own judgment. The statements, however, challenged a reply, and I looked, though in vain, for some defence. The paid management, whose competence and efficiency were so loudly impugned, has been silent—no doubt wisely silent. But the hard facts which appeared in the Society's *Journal*, though unanswered, were not unheeded. The little puffs sent the round of the press, to herald every petty addition to the Gallery, at once ceased; the annual vote of £2,000 was not, as heretofore, silently passed by the House of Commons, but called forth hostile remarks ominous for the future; and, lastly, a most significant fact, Lord Stanley, M.P., Vice-President of the Society of Arts, was appointed a Commissioner of the National Portrait Gallery.

The opportunity has now arisen for immediately locating this misplaced collection in a suitable gallery. The Turner Pictures have been, I am sorry to say, removed from South Kensington, and have left ample space for the National Portraits. There the collection may receive at once its true development, with all the additions which have been suggested. There the original intention of Lord Stanhope may be realised, and the large sums now uselessly wasted in establishment expenses may be devoted to the completion of the collection. The Society of Arts will, I am sure, feel confidence in the judgment of their Vice-President, and will trust that where he has authority no portion of the small funds devoted to the teaching and delight of all shall be misapplied; and what he may deem the best course for animating the still-born scheme of a National Portrait Gallery will be carried out; and we may see at South Kensington, even in May, 1862, the germ of a collection which we may not be ashamed to call by such a distinguished name. I am, &c.,

S. A. M.

October 3, 1861.

STRUCTURE OF METALS.

Sir,—Believing that the following information on the structure of some of the malleable metals will be new and interesting to your readers, I beg to offer it for insertion in your *Journal*.

It is well known that silver, copper, and malleable iron when newly broken give a very considerable reflection of light from the fracture, and it has generally been understood that the structure was granular, or composed of crystals, and that the reflection of light was from the angles of these; on examining specimens of the above-named metals with a microscope, however, I discovered that the structure was perfectly porous or cellular, and that the reflection of light seen was from the inner surfaces of the cells which, though minute, were most brilliantly reflected, especially when newly broken; and when the metal was bent a little in one direction before breaking, thereby presenting the sides of the cells to the proper angle, the reflection was then more fully seen than when the cells remained in their natural position.

There is a slight difference in the size and number of the cells in different specimens of the same metal, but the general resemblance is remarkably constant.

In silver, the form of the cell is somewhat oblong, but the cell is larger than the cell of copper or iron, and the system is more perfectly developed, that is, the internal communication from cell to cell appears to be more regular.

The form of the cell in copper is nearly spherical, but in some instances they seem to press into the domains of each other, and their forms are therefore to some extent modified thereby.

Copper from different works differs in the diameter of the cells, as well as in the number of them, but the range seems to be from five hundred to a thousand in the linear inch, and it should be remarked that a specimen of best select copper does not seem to have any portion of it absolutely solid and dense; on the contrary, the partitions between the cells are exceedingly thin, so thin, that there appear to be minute circular openings from each one to the surrounding cells, so that, as in silver, there is an internal communication through the entire mass.

The cells in iron are more irregular in size and form, their inner surfaces being jagged and uneven, and less brilliant than those of silver and copper; the best fibrous iron, however, seems to be equally free from angular crystals, and shows a high degree of porosity.

A good microscope, with low powers, say from two inch to half inch focus, is well suited to the observation.

This cell system is only developed internally in the metal; the outer surfaces, whether in contact with the mould or atmosphere, seem to be entirely destitute of these cells. The action of the tool also obliterates them, so that it is in the fracture alone that they can be seen.

In conclusion, I may say that it is my opinion that the malleability as well as the superiority of silver, copper, and iron, over other metals, for conducting heat and electricity, may be owing to the perfection of their cellular arrangement. I am, &c.,

W. VIVIAN.

Pary's Mines, near Bangor, N. Wales,
October 16th, 1861.

Proceedings of Institutions.

GLASGOW MECHANICS' INSTITUTION.—On the evening of the 4th of October, the prizes and certificates awarded by the Society of Arts to the successful candidates connected with the Glasgow Mechanics' Institution were presented, in the large hall of the building, which was well filled—the audience being chiefly composed of young men. Professor Anderson, of the University, filled the chair, supported by several of the directors. The CHAIRMAN said this was the third occasion on which he had been called upon to discharge this pleasing duty, and he did so with the greatest satisfaction. From his first connection with the Institution as chairman of the Local Board, he had taken great interest in the progress of these examinations, which he regarded as highly important, and calculated, in the course of time, to exercise great influence upon Institutions such as that with which they were connected. They were no doubt aware of the general character of the examinations which candidates were submitted to. The first step was that of ascertaing whether the student was fitted, from his general education, to be a competitor in any of the special subjects to which he wished to devote his attention, the Local Board testing his acquirements in hand-writing, the elements of arithmetic and a knowledge of the English language—branches of knowledge with which every one ought to be acquainted. The Local board had, therefore, a very important duty to perform—that of ascertaining at the outset, whether the students had sufficient knowledge to entitle them to go forward to the Society's Examination at all; in fact, they had the absolute power of stopping short any one whose abilities or knowledge was insufficient to carry him successfully through. This power, however, they exercised very charily, believing it was not right to prevent any young man going forward unless his ignorance was of a very gross description indeed; and, as a consequence, the number of students stopped had been very small. After having gone through this examination, the student passed a preliminary examination in the subject for which he wished a special certificate. These preliminaries satisfactorily passed through, the aspirants for the rewards of the Society of Arts had questions submitted to them, on the answers to which the final decision was to be given. These questions were identical all over the country; the students in London, Manchester, Glasgow, and elsewhere had the same printed queries given them on the same day and hour; so that they were all engaged at once in writing out the papers which were to be transmitted to the examiners. As these papers were judged by the same gentlemen, there could be no difference of criterion—every man was judged according to his ability. The members of the Glasgow Mechanics' Institution, he was happy to say, had reason to congratulate themselves on the result of the examination. Twice before he had been privileged to say this. On both previous occasions the students had stood very high, both in number and position, and he rejoiced to say that they had carried off this year a larger number of certificates than any Institution in the kingdom. They stood higher, not only in the total of certificates, but also in those of the first class. The number of first-class certificates awarded for the present year was twenty four, the Institution next in rank having gained fifteen; of second-class nineteen, another Institution having been awarded the same number; while of the third-class they had obtained fifteen, another Institution having gained nineteen. This statistical statement was undoubtedly important, as showing that since none could beat them in obtaining first-class certificates, the acquirements of the students must be high and varied. The point which appeared to him to be of the most importance was, that the number of high-class certificates was essentially dependent upon the previous education of the candidate; so much so, indeed, that if given the result of the students' examination in English reading, and so forth, he could tell who would gain first-class and who third-class certificates in their special subjects. Men with a good general education were those who would get the highest honours when examined on special subjects. He wished to impress upon them the importance of coming to the Institution with a good preliminary education; and if they happened to be deficient in this respect, he would have them endeavour at once to repair the loss. It seemed to him absurd to give a certificate in mathematics, or electricity, or any other subject, to a man who could not spell correctly nor write a good hand. Certificates had been obtained in nearly all branches of knowledge—in arithmetic, the various departments of mathematics, the different branches of physical science, electricity, magnetism, chemistry, and so on. Languages, also, were represented, more especially French, which, on this as on previous occasions, appeared to be a favourite subject of study. He was, however surprised to find that English language and literature had not yet been properly taken up in the Glasgow Mechanics' Institution—a branch of study which merited a greater amount of attention upon the part of young men generally than it commonly received. The certificates he was about to present were of such a character as to ensure for the young men favourable consideration in active life. They indicated that, having felt certain deficiencies in their early education, they had resolved to acquire additional knowledge. The students were, therefore, picked men, whose aim was to acquire knowledge, and herein lay the great part of their success.—The Chairman then proceeded to present the prizes and certificates of merit to the successful competitors.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, October* 11*th*, 1861.]

Dated 19th September, 1861.

2334. J. Clough, Bolton-le-Moors—Certain imp. in machinery for preparing cotton and other fibrous substances.
2336. J. Durrant, Granville-terrace, Lewisham, Kent—An improved form of coal box, combining within itself a cinder sifter, an ash and dust pan, and receptacles for other requisites connected with domestic fire stoves.
2339. E. Breffit, King William-street—An improved fuel.
2346. A. J. Sedley, 210, Regent-street—Imp. in metallic bedsteads and sofa bedsteads.

Dated 20th September, 1861.

2350. B. Smith, Birmingham—Imp. in taps and cocks.
2358. G. T. Bousfield, Loughborough-park, Brixton—Imp. in machinery for combing cotton and other fibrous material. (A com.)
2360. G. T. Bousfield, Loughborough-park, Brixton—Imp. in machinery for manufacturing shoes for horses and other animals. (A com.)

Dated 21st September, 1861.

2364. J. Fenton, Low Moor, Yorkshire—An improved method of causing the water to circulate in steam boilers.
2366. A. Parkes, Birmingham—Imp. in the manufacture of castings, rods, bars, bolts, nails, rivets, and sheets when alloys of copper are used.
2368. S. Desborough, Noble street, St. Martin's-le-Grand—Imp. in the manufacture of pins for hair, dress, jewellery, and other purposes.

Dated 23rd September, 1861.

2370. C. Stevens, 31, Charing-cross—Imp. in the manufacture of steel and in the hardening of metals. (A com.)
2372. J. Kenyon, Blackburn—Imp. in the treatment of yarns or warps previous to their being sized.
2374. V. Jankowski, 4, Princes-street, Fitzroy-square—Imp. in carriages.
2376. J. Price, Dundalk, Ireland—Imp. in the permanent way of railways.

Dated 24th September, 1861.

2378. J. D. Parkes, 47, Parliament street, Westminster—Imp. in the propeller of a ship. (A com.)
2380. A. J. Sedley, 210, Regent-street—Imp. in constructing bridges and viaducts.
2384. J. Fawcett, Wakefield—An improved material particularly adapted for the scouring, cleansing, and fulling of woollen or other cloths.
2386. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in the process of preserving provisions, and in the apparatus employed therein. (A com.)

Dated 25th September, 1861.

2390. T. Bright and R. Mills, Rochdale—Imp. in apparatus or means employed in the printing of yarns for carpets and other fabrics.
2392. R. A. Brooman, 166, Fleet-street—Imp. in apparatuses for letting off water from and for admitting oil or other lubricating matter into steam cylinders. (A com.)
2396. T. Richardson, Newcastle-upon-Tyne—Imp. in the manufacture of muriate of iron for the purification of coal gas.
2398. G. Russell, Swan-hill, Shrewsbury—Spring stretchers or bedsteads for camp, hospital, or general use.

Dated 26th September, 1861.

2400. T. Bentley, Margate, Kent—Imp. in apparatus for beating eggs, and for mixing or agitating other fluids, compounds, or matters.
2402. J. Openshaw, W. Entwistle, and J. Lord, Bury—Certain imp. in "mules" for spinning cotton and other fibrous substances.
2404. J. H. Johnson, 47, Lincoln's inn-fields—Imp. in smoothing irons. (A com.)
2406. G. T. Bousfield, Loughborough-park, Brixton—Imp. in knapsacks. (A com.)
2410. V. S. Lété, Paris—Imp. in aerated or sparkling white wines.
2412. W. Clark, 53, Chancery-lane—Imp. in the manufacture of peat. (A com.)

Dated 27th September, 1861.

2414. F. W. Shields, 47, Parliament-street, Westminster—An improved method of applying wrought iron or steel plates to the covering and protection from the effects of shot and shell of forts, buildings, floating vessels, and other constructions.
2416. J. Kimberley, Birmingham—A new or improved machine for mortising, tenoning, sawing, boring, drilling, and grooving wood.

Dated 28th September, 1861.

2422. J. A. Knight, 4, Symond's-inn, Chancery-lane—An imp. in steam pumping engines. (A com.)
2426. D. Lane, Cork—Imp. in apparatus whereby to regulate the passage or flow of gas, water, and other fluids.
2428. T. Potts, Old Kent-road—An imp. in clasps for books, portfolios, desks, and other similar articles.
2430. C. Comer, jun., Salford—Imp. in the manufacture of metal tubes for bedsteads and other purposes, and in the machinery employed therein.

Dated 30th September, 1861.

2434. B. G. George, Hatton-garden—Imp. in the mounting of tablets, show bills, prints, photographs, and drawings, and of producing embossed ornamentation applicable to various purposes.
2440. F. Walton and R. Beard, jun., Chiswick, Middlesex—Imp. in the manufacture of varnishes applicable to the waterproofing and coating of fabrics and other uses.

Dated 1st October, 1861.

2444. O. O. Lesourd, Paris—Imp. in joining pipes and tubes or in forming or securing the joints thereof. (A com.)
2446. J. W. Scott, Worcester—An imp. in gun wads.
2448. W. H. Payn, Dover—Imp. in apparatus for preventing the loss of and facilitating the recovery of ships' moorings and submerged property in general. (A com.)

Dated 2nd October, 1861.

2450. J. Hesford, Bolton-le-Moors, Lancashire—Certain imp. in steam engines, and in valves for steam and other fluids.
2454. A. Fowler, 4, Scott's-yard, Cannon-street—Imp. in buffers of railway carriages.
2456. W. Maltby, De Crespigny-park, Camberwell, Surrey—Imp. in the manufacture of starch and starch gum.
2462. C. G. Hill, Commerce-square, High-pavement, Nottingham—Imp. in machinery, or in apparatus connected therewith, in the manufacture of bonnet and cap fronts, rouches, and millinery or other trimmings.

PATENTS SEALED.

[*From Gazette, October* 11*th*, 1861.]

October 10*th*.

642. J. A. Phillips.
833. P. G. Gardiner.
895. R. A. Brooman.
89-. S. Roberts.
899. J. M. Dunlop.
903. J. Ward and R. Greenwood.
907. F. Bailey.
911. G. Graham.
912. H. Maden and J. Wheater.
914. C. Roberts.
921. E. Brooks.
923. A. Sax.
924. T. Miller.
927. F. Gye.
931. P. Gipouloux.
933. R. Ransome.
939. J. R. Hill.
941. J. Vickerman.
942. G. Leroy.
944. B. Brown and R. Hacking.
945. W. Clark.
957. C. Jordan.
974. H. Parkes.
976. W. Ryder and T. Ryder.
981. J. B. J. Noirot.
1012. M. Henry.
1093. W. Walton.
1125. W. C. Homersham.
1150. W. E. Newton.
1876. E. Sang.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, October* 11*th*, 1861.]

October 7*th*.

2213. C. W. Lancaster.
2344. T. Twells.

October 8*th*.

2256. J. Holroyd.
2277. M. Sautter.
2307. G. F. Wilson.

October 9*th*.

2259. J. Beattie.
2283. A. Beda.

[*From Gazette, October* 15*th*, 1861.]

October 10*th*.

2258. J. Saxby.
2269. J. F. Swinburn.
2270. L. Wray.
2291. T. Ingram.
2321. C. West.

October 11*th*.

2274. Capt. G. Beadon, R.N.

October 12*th*.

2287. L. Cowell.
2294. H. Martin.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, October* 11*th*, 1861.]

October 8*th*.

2180. E. J. Seville.

[*From Gazette, October* 15*th*, 1861.]

October 10*th*.

2210. E. Bernot.
2357. T. Metcalfe.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietor's Name.	Address.
4410	Sept. 27.	Harrison's Universal Luggage Label	John Harrison	26½, Ann-street, Birmingham.
4411	,, 27.	Pig Trough	Ransome and Sims	Ipswich.
4412	,, 28.	The Victoria Safety Brooch Fastener	Richard Bestell	35, High-street, Croydon.
4413	,, 28.	Improved Stable Fittings	William Owen	Phœnix Works, Rotherham.
4414	Oct. 5.	Part of a Combined Cruet Frame and Call Bell	William Spurrier	Birmingham.
4415	,, 7.	A Wet Gas Meter	R. Laidlaw and Sons	Edinburgh.

Journal of the Society of Arts.

FRIDAY, OCTOBER 25, 1861.

COUNCIL.

The following Institutions have been taken into Union since the last announcement:—

Godalming Institute.
Barnsbury Literary Institute.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £434,700, have been attached to the Deed.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

The domes are the only portions of the building about the completion of which in due time any reasonable anxiety might be entertained. The preparations have been carried on on the banks of the Thames, but until this last week no signs of progress (with the exception of the arrival of great quantities of iron) have been visible at South Kensington. Perhaps the fixing of this iron work might have commenced before, and the delay may be occasioned by the absence of the chairman of the Thames Iron Company, Mr. Peter Rolt, who has been abroad. Upon him, Captain Ford the manager, and Mr. Hussey, rests the responsibility of completing this work according to the contract, and it will, doubtless, be the pride of these gentlemen to execute it in a manner which shall reflect the greatest amount of credit on the company they represent.

Besides the domes a commencement has been made in fixing the ironwork of the roofs of the glass courts, and a considerable quantity of the wrought-iron girders made by the Thames Iron Company are now on the ground and ready to be hoisted.

The brickwork for the upper story of the refreshment rooms it is expected will commence next week; all the technical and legal difficulties between the Commissioners of 1851, the Commissioners of 1862, the contractors, the surveyors, and the lawyers, have been happily adjusted. These arrangements have delayed the issue of the refreshment contracts, but they will now be out in a few days.

Meanwhile the other parts of the building have been pushed forward with the same rapidity as before. The western dome-scaffold is nearly finished, and the galleries on all sides are being floored. Already one-half of the picture gallery along the Cromwell-road is glazed, and a portion of it is ready for the plasterers.

The subject of the Mosaics for the decoration of the exterior of the building, which was alluded to last week in this *Journal*, has received confirmation of its importance and practicability. Messrs. Minton have made a most successful experiment in translating a head of colossal size into small tesseræ. This is the first work of the kind which has been attempted in the Staffordshire potteries, and conclusively proves that wall mosaics may be executed in this country which will bear comparison with any similar work of antiquity. It is hoped that three mosaic pictures may be completed in time for the Exhibition. The Council of the Society of Arts has unanimously voted the sum of 100 guineas towards the funds necessary for making the experiments.

The Secretary-General of the French Commission has been in England during the past week, and still asks for more space to satisfy the wants of the French exhibitors. The quantity now allotted to France is 132,000 square feet, as against 119,000 occupied by that country in 1851, but M. Le Play is authorised by his Commission to press a claim for 45,000 more.

It is evident that Her Majesty's Commissioners with their limited resources can scarcely comply with this demand. Nearly one-third of the space apportioned to foreign countries has been assigned to French exhibitors, and although that amount may be increased by handing over to them portions which others are unable to fill, anything like the increase which they contemplate is out of the question.

It is expected that France will make a considerable display in machinery. The great firm of Messrs. Cail have demanded as much space as could be afforded to all the exhibitors of French machinery.

The following additional arrangements have been made:—

CANADA.

The following gentlemen have been appointed a Commission for the Province of Canada:—Sir William E. Logan, F.R.S., Government Geologist, *Chairman*; the Hon. L. V. Sicotte, President of the Board of Agriculture, Lower Canada; E. W. Thomson, Esq., President of the Board of Agriculture, Upper Canada; J. Beatty, jun., Esq., M.D., President of the Board of Arts and Manufactures, Upper Canada; J. C. Taché, Esq., M.D., and B. Chamberlin, Esq., Secretary to the Board of Arts and Manufactures, Lower Canada.

GUATEMALA.

John Samuel, Esq., Consul-General of Guatemala, will act as London Commissioner for that Republic.

Exhibition Traffic.

On Tuesday the representative vestry of Chelsea met to take into consideration a letter from Mr. C. Wentworth Dilke, one of the Commissioners of the Exhibition, urging the importance of widening the street from Eaton-square to Sloane-square in anticipation of the traffic which will take place next year between the Victoria station and the Exhibition buildings. Mr. Perry moved that the question be referred to the Committee of Works, and that they be called upon to appoint a sub-committee to consider the best means of carrying out the improvements suggested without delay. Mr. William Hall seconded the resolution, which was unanimously agreed to. A special committee was appointed at the last sitting of the Kensington Vestry to consider and report on the best means of widening the approaches through that parish to the Great Exhibition building, and of removing at the same time the turnpike bars now placed on these thoroughfares. They are now busily engaged in inquiring what arrangements can be made to effect these objects.

THE BRITISH COLONIES AND THE INTERNATIONAL EXHIBITION.

By P. L. Simmonds.

No. VII.—The Australian Colonies.—Tasmania.

Since the discontinuance of transportation to this island, the name of the colony has been changed from Van Diemen's Land to Tasmania. The colony is now in a very altered and improved position to what it was in 1851, the progress of population and the gold discoveries in the colonies on the main land having greatly contributed to its advancement. Its external trade has doubled in value; the local improvements have been great, and its agricultural progress steady, a better class of settlers having made it their home.

His Excellency the Governor, early in the year issued a Commission, appointing the following gentlemen to be Commissioners to make the necessary arrangements to secure the adequate representation of the products of the colony in the International Exhibition of 1862:—William L. Crowther, Esq., (Chairman), Morton Allport, Esq., the Hon. William Archer, M.H.A., James Boyd, Esq., Richard W. Butler, Esq., James Erskine Calder, Esq., the Hon. Thomas D. Chapman, M.H.A., Henry Cook, Esq., Mayor of Hobart Town, Henry Dowling, Esq., Mayor of Launceston, Sir Richard Dry, William Rose Falconer, Esq., the Hon. P. H. Gell, M.L.C., Charles Gould, Esq., Ronald C. Gunn, Esq., H. T. A. Murray, Esq., Circular Head; Robert Officer, Esq., M.H.A., James Scott, Esq., Launceston, J. F. Sharland, Esq., and W. Alcock Tully, Esq. George Whiting, Esq. acts as secretary in Hobart Town, and the Commission has met weekly.

No British colony recognised the value of such Exhibitions more readily than Tasmania did in 1851, when her exhibitors obtained six prize medals for her woods, two for her wheat, two for her collections of raw produce, and nineteen honourable notices for her wool and various other natural or industrial products. After such an indication of public spirit in Tasmania, it is not likely that she will fail to do herself justice in the forthcoming Exhibition, which it is believed may be made greatly to excel that of 1851 in completeness of arrangement and comprehensive utility.

The Government have agreed to advance to the Island Commissioners money to the amount of £2,000 (including £500 previously advanced) for collecting and exhibiting the products of Tasmania in Hobart Town, and recommend to Parliament a further grant of £1,000 for their transmission to and exhibition in England. The Commissioners have resolved on transmitting about £300 of the sum intended for the use of the London Committee in the shape of Tasmanian gold, which can thus be exhibited as a colonial product, and afterwards converted into cash for the purposes of the committee.

But this circumstance must be borne in mind—namely, that it is only on the principle of the division of labour, and by the voluntary individual co-operation of the most intelligent and patriotic portion of her population generally, that Tasmania can hope to maintain the honourable position she gained in 1851, or to fairly compete with her more powerful and wealthy neighbours. The Government of New South Wales has munificently placed at the disposal of the Sydney International Exhibition Commissioners the sum of £3,000, and also £5,000 for the purchase of specimens of gold—to be sold in Paris after the Exhibition—in order that that important colony may be adequately represented. This fact is mentioned in proof that if Tasmania be expected to hold her own in the race of generous emulation on which she is entering, it can only be done by the most energetic and strenuous exertions.

The progress of every country must depend almost wholly on its physical and industrial resources—as the commercial and manufacturing supremacy of Great Britain is mainly attributable (next to the energy and enterprise of the Anglo-Saxon race) to the practical contiguity of her coal, her iron ore, and her limestone. It is little more than two centuries ago that all the iron produced in England was smelted by wood charcoal, in the woodland districts, just as large quantities of iron are now smelted in the United States, and as iron may possibly be smelted profitably even in Tasmania. England attained a knowledge of her most economical processes by slow degrees, having no International Exhibitions to instruct her. Tasmania cannot, at present, boast of being a gold-producing country to any great extent, but geological analogies have too much weight in the present day to permit it to be doubted that a country so nearly identical in geological structure with the colonies which produce the precious metals, and also copper and lead so abundantly, must itself contain some valuable but undiscovered mineralogical resources, which may be developed by industrious research. It is only by having numerous observant eyes and reflective minds engaged in searching for them, however, that these mineralogical treasures can be discovered, and no project more suitable than a public Exhibition can be devised for stimulating and rendering such individual explorations effective.

The Commissioners proposed to hold an Exhibition in Hobart Town on the 1st of October, and to give prizes for the best articles exhibited, and invited their fellow colonists to assist them, by contributing specimens of every mineral which can serve to elucidate and develop her resources. Such specimens were to be described as "occasional" or as "abundant" in their respective localities, to prevent false inferences as to their indicational value: and all products sent with the distinct understanding that they are to be transmitted to England or not, at the discretion of the Commissioners.

New discoveries are constantly taking place in every country, in which some product previously unknown is found to possess commercial value. The discoveries of phosphate of lime, so much in demand for English agriculture, in the coprolites of the Suffolk Crag, at Estramadura, in Spain, and in many parts of America, may be taken as an instance of the importance of intelligent exploration. It is believed that this substance abounds in the guano on the islands around the coast.

The great forte of Tasmania is in her woods, for which, in 1851, she gained six prize medals and five honourable notices. It is felt, however that her more durable timber was scarcely done justice to in 1851. Since the failure in the adequate supply of English oak, hard woods, such as those of Tasmania, are so much in request for railway and shipbuilding purposes, that iron has in many cases been systematically substituted for them.

It is intended to exhibit, in 1862, large specimens of knees and other portions of Tasmanian ship timbers, which have been found to be so durable, and unsusceptible of injury from dry-rot. Any well-authenticated instances of the durability of Tasmanian timber, as furnished by old piles, posts, &c., which have been for many years exposed to at-

mospheric influences, will be most useful in proving and illustrating this its most valuable quality.

The ornamental woods of this colony excited great notice in 1851, as admirably suited for cabinet work. Some of the best woods are to be sent home and made up in the most finished style, to be exhibited as manufactured specimens.

The Commissioners state:—"It is proposed to make our timber the main feature of the Tasmanian Exhibition. We intend to illustrate not only our marketable hard timber of all sorts as now sold here; but also to send home some very large specimens of ship timber in knees, planks, &c., such as perhaps no other country can furnish of equal quality and in similar abundance. Timber suitable for railway sleepers, telegraph posts, &c., will not be forgotten, whilst our beautiful fancy woods will be illustrated, not only in made-up specimens of cabinet work, but also in polished slabs, and in the rough, the stem wood, as well as the root wood. To illustrate the size of our timber, a very large section of a tree will be sent hooped, including the bark. A plank of great length will also be procured from Port Arthur. Application has also been made to Her Majesty's Commissioners, for space in the main avenue for a Tasmanian Timber Trophy, similar to that exhibited by Canada in 1851, to occupy a space of twenty feet square. We shall endeavour to construct this trophy here in as picturesque a form as the materials will admit of. The magnitude of its dimensions will render it a striking object, and if embellished by an admixture of our fancy woods, it may perhaps even be rendered an attractive one. Amongst our large objects will be two pairs of the jaws of the whale, which may possibly be shown to advantage, either in the Timber Trophy or in connection with our show of oils. In reference to our timber, we may here mention that Mr. Boyd, most energetically, will prepare an herbarium illustrative of our timber trees, of which Mr. Morton Allport has also undertaken to supply stereoscopic views."

Our shipments of timber in the shape of railway sleepers, &c., still continue as opportunities of sending it home as dead weight offer. Some discussion has arisen as to the possibility of sending it into market at a less price than was estimated in former calculations, and hopes are entertained that henceforth European engineers and contractors who may be disposed to make use of our hard woods, will be able to realise the condition of cheapness as well as the superiority of material. Much will be done to throw light upon the extent to which this colony is in a position to meet the requirements of the great manufacturing and engineering interests of the world, by the illustrations forwarded from Tasmania to the Industrial Exhibition of 1862.

It is believed that the samples of wheat, flour, and wool will fully equal in quality those which in the Exhibition of 1851 obtained prizes and honourable mention, and furnish satisfactory evidence of the still exuberant fertility of our soil.

The wheat exhibited by Tasmania in 1851 was specially noticed by the jurors as being the finest from any part of the world, excepting only that from South Australia. The flour was also highly eulogised—as were biscuits manufactured from it. It is confidently assumed that the agricultural interests of Tasmania will not be allowed to lose the 'vantage ground thus gained.

Experiments are being made on the bark of the stringy-bark, gum, peppermint, silver wattle, &c., in order to ascertain their relative value as material for cordage, mill-board, paper, &c. The fibres of flax, native flax, and other herbaceous plants will also be represented. The experiments on the production of a paper-fibre have been attended with some recent results of a very satisfactory character, and some beautiful samples of bleached fibre will be exhibited.

One of the Commissioners, Dr. Officer, is engaged in distilling oils from the leaves of the gum tree, and of other Tasmanian trees, which may be supposed to possess remarkable medicinal properties. A confident hope is also expressed that a good specimen of paraffine oil will be forwarded. Of this there can be no doubt. The oil has been produced in the colony in the purest form, and has answered the purpose of illuminating houses, theatres, concerts, &c., with brilliant effect. The proper hope to be expressed is that the bed of shale or dysodyle, which furnished the material from which the paraffine oil was distilled, will prove sufficiently extensive to furnish the basis of a large and profitable enterprise.

This colony has long been famous throughout Australia for the production of magnificent specimens of nearly all the fruits and vegetables of Europe which have been acclimatized here. The export of fruit constitutes one of the leading branches of our summer trade. Nor is it likely to decline, as some have supposed, in consequence of the extension of orchards in the other colonies—especially in Victoria, where large tracts of land are being brought under garden culture. The extreme changes of the season and temperature to which the colonies on the main are subject, and the destructive effects of a hot wind on all vegetation, and especially on growing fruit, will always render the prospects of a crop in the highest degree precarious. Besides which this greater heat forces the fruit and ripens it at a much earlier date than in Tasmania, so that the garden produce of Victoria would be exhausted before the colony would be ready to pour its supply into the market. We have every reason to look forward therefore to fruit and vegetables as constituting one of the chief exports of Tasmania. The illustrations of its fruit-growing capabilities, which will be seen in the Exhibition, will serve two purposes. In the first place they will show the gardener what a field there is afforded him for his enterprise. In the second place, they will prove how much the colony has to offer to the immigrant of the luxuries of the old land. Under the head of Tasmanian Fruits the Commissioners say:—"Most of the finest prize specimens exhibited at our last Horticultural Show will be represented, in coloured photographs or in wax models, together with as perfect a list of the various sorts of fruit grown in Tasmania as the secretary can procure."

The wool of Tasmania, the principal staple export—which was honourably noticed in 1851, and in the getting up of which great improvement has been made within the last ten years—will, it is confidently anticipated, be fairly represented by the "clip" of the coming season, especially as to fineness of fibre, combined with length of staple.

The whaling interest, which has recently received a new impetus, will probably supply very superior specimens of the different varieties of oil, head-matter, whalebone, &c.

The manufactured articles shown will probably be few in number, but it is intended to send a supply of the best fancy woods to be made up into cabinet work, and a quantity of the best skins to be converted into railway rugs, &c., by London furriers. The fancy woods will probably thus be seen to advantage, even in comparison with the best furniture of all countries. It is to be hoped that before the time for completing the collection of specimens has arrived, the Commissioners will find themselves in a position to do much greater things than they have thus modestly promised. The local journals add,—"We have all the ordinary domestic manufactures established amongst us, and have it as much within our power to forward, for instance, specimens of colonial boots made of colonial skins, as Paris to forward its contributions of patent leather and kid. Our manufactures embrace a wide range, and it is of the highest importance that this department should be made, in a complete sense, illustrative of the state of the industrial arts in Tasmania."

It is feared that the colony will scarcely be able to furnish any considerable collection of gems, unless perhaps Dr. Milligan may be able to do so, from the ample store which that gentleman collected whilst a resident in the colony.

The principal specimens of minerals forwarded for ex-

hibition will probably consist of coal and dysodyle or bituminous shale. Mr. Gould, whose reports on the coal-beds of the colony have re-awakened public interest in this branch of enterprise, will furnish specimens of each coal-field, showing the actual thickness of the seam.

Iron-sand and iron-ores, with gold, are, however, among Tasmanian products; whilst granites, marbles, and limestones are abundant.

This colony, possessing only a population of ninety thousand souls, and raising a revenue of three hundred and fifty thousand a-year, has in the Derwent, on which its capital is built, one of the most magnificent harbours in the world—one ranking with Cork, with Rio Janeiro, and with Port Jackson; a climate temperate, salubrious, and delicious, which is sought for its invigorating qualities by the parched denizens of the colonies beyond the Straits; a soil capable in its virgin richness of yielding an increase to the agriculturist that to an English farmer would sound fabulous; vast deposits of fertilising manures on its isles and islets; facilities, created by nature herself, for the artificial irrigation of great tracts of country, on whose hill-tops are suspended chains of lakes; water-power capable of being used for manufacturing processes, and exhaustless forests of timber, beds of coal, and other valuable minerals. These rich endowments indicate to the thoughtful mind the future of Tasmania, as the seat of a busy industry, and the great source of supply to the markets of Australia.

Tasmania has yet a great part to play as one of the industrial centres of Australasia. It will be her destiny, when the mutual relations between the several colonies, natural to the endowments of each, become developed, to supply the teeming population of Australia with a large proportion of the manufactured goods they consume. Unquestionably this colony will become the seat of a great productive industry. The activity of her workshops, her looms, her factories, will afford rich compensation for the want of gold-fields. That day of manufacturing prosperity will not come upon the colony suddenly. We may recognise already its faint early dawn. It depends entirely on themselves to speed the advent of its noon. Gradually, if alive to their responsibilities, they may force their manufactured wares into the colonial market. It is in this light we see the importance of promoting amongst the rising population an industrial art education.

The colonists would doubtless have attended to these matters—which, indeed, constitute the true work of Tasmania—before, but for the intervention of causes that have distracted their attention from the special duty which Providence has assigned them in the Australian system. Looking with envious eyes upon the great strides made by Victoria and New South Wales—the former colony especially—consequent on the discovery of the gold fields, they endeavoured to discover within their own borders auriferous deposits, not sufficiently mindful of the fact that the timber that clothes their hills, the coal that lies buried beneath their soil, the raw material they possess in abundance for various manufactures, their genial climate, their fertile soil, their rivers and mountain streams, available the one for motive power, the other for carriage, were the real gold fields of Tasmania.

A space of 650 superficial feet has been accorded to the colony, which is sure to be well filled, for in the island papers just received I notice the following statement made:—"We heartily congratulate the Commissioners appointed to secure the adequate representation of the interests of the colony in the coming Great Exhibition of 1862, on the success which we learn has attended their labours up to the present time, in obtaining specimens of our natural and industrial products. We are aware that—as we believe is usual in almost all initiative proceedings of a kindred nature—some considerable apathy was in the first instance manifested by the residents both of the towns and the country districts of the colony. We have at length the gratification of perceiving that a growing interest in the labours of the Commissioners is becoming manifest, and we now doubt not, that on the assembling of the various representatives of other climes within the great metropolis the various products of our colony will command that attention which they undoubtedly deserve."

The Commissioners in London representing this colony consist of the following gentlemen:—F. A. Ducroz, Esq., Dr. Joseph Milligan, F.G.S., and James Youl, Esq., men who have rendered important services to the colony. Dr. Milligan was for some years secretary to the Royal Society of Tasmania, and, it will be remembered, read a most interesting paper before the members of the Society of Arts last session, for which he was awarded a silver medal by the Council.

INTERNATIONAL EXHIBITION OF 1862.

SANITARY APPLIANCES.

The following paper has been received from Mr. Edwin Chadwick, C.B., who, in a letter to the Secretary of the Society of Arts, says:—

"The following programme was drawn up by me for the Committee on Sanitary Appliances for the International Exhibition of 1862. A wish having been expressed that I should make it public, I submit it to you, although it is incomplete, with the view of suggesting to Foreign as well as British Manufacturers, the rank and importance of classes of articles of their production as means for improving the health and comfort of populations. Some of the articles referred to have had their chief development in this country since the Exhibition of 1851.

"Richmond, Surrey, S.W."

1.—Since the last Exposition, the use of tubular house drains and sewers has been developed. It is known that upwards of eleven thousand miles of such drain-pipes have been manufactured. There are great varieties of material—vitreous pipes; red ware pipes; socket-jointed pipes; rabbet-jointed. They are now exported to America and to Australia. Accuracy of form and jointing are qualities of special importance for this description of articles. On the trial of some to which increased accuracy was given by mechanical pressure, after the clay had been partially dried, about one-fourth more rapid discharge and power of sweep for self-cleansing, was found to be given to pipes of the same diameters and inclinations, and with the same quantities of water.

Since the last Exposition new forms of apparatus, valves, and traps, to prevent the ingress of foul air into houses, have been introduced in great variety. The manufacture of soil-pans and water-closet apparatus is largely increasing with the abolition of cesspools in towns; and the production of this species of apparatus was lately known to be proceeding at the rate of upwards of a thousand a day. A great improvement in the health of the population, almost house to house as they have been introduced, and communication from sewers of deposit prevented. The qualities sought for in the construction of this apparatus are:—1st. A complete sewer for the removal of the soil. 2nd. The best trap against the ingress or regurgitation of effluvia from the general system of town drainage and sewerage with which each soil-pan and house-sink must communicate. 3rd. The consumption of the least quantity of water for a complete sewer and perfect trap. 4th. Durability, *i.e.* freedom from liability of breakage in consequence of frost, from derangement of the machinery, from breakage by careless usage, from stoppages. 5th. Easy repair. 6th. Cheapness when manufactured on a large scale. In some of these apparatus, complete removal is effected by half a gallon of water, in others two gallons of water or more is used. Attention has not hitherto been paid to the importance of effecting the cleansing purposes with the least quantity of water, with a view to the avoidance of the unnecessary bulk of sew-

age, and to excessive unnecessary dilution, for the application of the sewage to agricultural production. This description of apparatus would form an important subject of interest to officers of public works, Foreign as well as British, and to colonists and foreign architects who are beginning to follow the example of England in sanitary matters.

2.—The manufacture of pipes and apparatus for the collection and distribution of water into towns and houses may display considerable advances. For the spring collection of water, the permeable agricultural pipe drains have been of late much used in England. For water leading, earthenware pipes have come into use very beneficially, but of small diameters, and very low pressures, seldom exceeding thirty or forty feet, but not at all for the interior of towns and houses, although from Roman and Greek remains, and the instructions of Vitruvius, they were anciently used successfully for house as well as town supplies, under a hundred feet of pressure and more, by contrivances for the avoidance of fracture by hydraulic jerks. In France water has been distributed under pressures of upwards of one hundred and sixty feet. In several parts of the Continent, vitreous earthenware as well as glass has been used for the distribution of gas as well as water. Besides the greater economy of the material, it has for the distribution of water the advantages of greater purity than metal, which oxidises. The complete collection of these appliances would be very interesting. It is now found that lead piping has on some waters a more extensive and injurious effect than has hitherto been apprehended. To obviate this in pipes for house distribution, an interior lining of non-metallic enamel has been applied. Enamels composed chiefly of coal tar, as well as of vitreous materials, have been applied extensively to wrought as well as to the largest cast-iron trunk mains. With the increasing demands for the introduction of water into cities and houses, and manufacturies, new demands have arisen for improved water meters. Of the whole quantity of water pumped into London, nearly three-fifths was found to be pumped in waste. In other towns the waste of water is often in as great proportion. Since it is proved to be necessary, on sanitary grounds, to discountenance the storage of water in houses in crowded districts, where it absorbs foul gases, and to deliver water direct, the prevention of waste has become a matter of great importance, and hence a great variety of taps and self-closing apparatus and contrivances for the purpose.

Up to the year 1854 the General Board of Health had sanctioned, or prepared sanctions, to an expenditure of about six millions of money by Local Boards of Health for the sanitary improvements of towns. One part of the expenditure was for earthwork, the remainder was chiefly for new apparatus of a description which would come under the two above-recited heads. Since that time probably an equal amount of expenditure has been incurred on the like appliances in the British towns alone.

3.—About the time of the last Exposition the estimated washing bill for the metropolis was five millions sterling per annum, and it was probably under-estimated at that amount. By a general smoke consumption, if only to the extent to which smoke consumption has been effected in particular instances, the fouling of clothes and the expense of washing might be reduced one-half. Five-sixths of the heat from the combustion of coal, or some such proportion, escapes unapplied in the common chimneys. Since the last Exposition more attention has been directed to the subject, and there have been new grates and kitchen-ranges invented with the pretensions of consuming smoke or economising heat. A portion of the English fire-grates have been examined by a commission on warming and ventilation, which made a report about two years ago. Since then other inventions have been brought forward in England. A portion of the English kitchen ranges have been examined by a commission on barracks and hospitals. These partial trials have had, however, by no means the public or professional attention which is due to them. Some of the grates pretend to save two-thirds of the fuel, and there is little doubt several save half. But on the Continent, particularly in France, where fuel is very dear, the exertions to economise it appear to have been far greater. In America, also, considerable advances in this species of appliance have been made. It is reported that the French cooking ranges are worked with half the fuel of the most approved, and with a quarter the quantity of fuel consumed by the common kitchen ranges in England; and that cottagers' grates in France are made to suffice with one-third the fuel used here. In Paris the warming of some large public edifices appeared to be less expensive than in Manchester, where coal is little more than a quarter the price. It is stated that in Austria, in Vienna in particular, open fire places are in use, lined with a cleanly and very ornamental earthenware, which are of very great warming power. It is also stated that very superior and very ornamental apparatus of this description is in use in Sweden. Tuscany has terra cotta, or red ware clay fire-places, which are works of art.

It would be one of the greatest practical achievements of the Exhibition if the opportunity were taken to obtain a complete collection of all the best apparatus of this species, foreign as well as British, and to have their warming or cooking powers tried, and the results reported. With this view, it is proposed that a room or rooms should be prepared for the purpose, and inventors be invited to send their apparatus for trial, and competent persons should be appointed to conduct the trials. They should be conducted as competitive examinations, and the results made public. The proceeding might be expected to be one of great interest, and it might be commenced long before the opening of the Exposition, when the apparatus tested might be exhibited.

The Commissioners of those countries where fuel is the most scarce, and which have the greatest interest in the subject, should have their attention specially directed to it, and they may be expected to give active aid upon it. The French Commissioners, as also the Austrian, may be requested to have preliminary trials made, and to bring over their best, with an account, to be re-tested, of their power of warming, with a given quantity of fuel, a given space; or in cookery, of cooking rations with given quantities of fuel. The variations of the English ranges exhibited in the report of the Commission for the sanitary improvement of barracks and hospitals, was from 64 ounces to $2\frac{3}{8}$ ounces daily of coal per head of men cooked for.

At Paris, an apparatus in the form of a worm, kept filled with water, and placed in a chimney, was reported to catch two-thirds of the heat commonly wasted, and in the hot-water, to convey it to parts of buildings distant from the chimney, for the purpose of heating them. In other ways the chimney heat, so extensively wasted in England, has been utilised of late by French architects.

By directing attention to points of selection, giving its place to none without fair specified pretention to distinction, either in improved construction, or quality, or reduced price, space may be saved and the objects of the Exposition promoted.

4.—The preceding observations are applicable to apparatus for ventilation, in which there has been at all events an increase of attention since the last Exposition. At Paris there have been some important trials; and reports on competitions between methods of hospital ventilation, applicable to other buildings, if not to private houses, have been made. A hot-water tank at the top of a building, through which pass the ends of flues for the removal of vitiated air, is reported to be a very cheap and easy working power for the constant change of air.

5.—Two great evils in house construction are (1) damp in walls, which, by evaporation, lowers temperature, and produces one class of diseases; and (2) absorbence of the mephitic gases. A common English brick absorbs almost a pint of water. A newly constructed house requires several months to dry. A row of new houses when first inhabited, are sure to be productive of a crop of illnesses.

Those who visit the lower class of houses, in which dead bodies have been retained, are aware how long the dead man's smell remains in walls. Miss Nightingale makes it a great point to obtain non-absorbent walls and wall surfaces, as well as floors for hospitals. It would be of great importance to ascertain what progress has been made in this matter since the last Exposition by improved hollow brick. The degrees of absorbence of various materials, or of combinations of materials, might be advantageously tested, and the results noted on the materials.

For all the earthenware materials, whether drain tiles, house and town drains, hollow pot bricks and tiles, plans and models of kilns of an improved construction, which consume the least amount of coal, and which are of easy construction, for rural districts and for the colonies, are of great interest and importance for sanitary works; also, improved tile, pot, and brick-making machines.

The objects of this portion of the Exhibition may then be thus classified for the attention of Foreign as well as of British exhibitors:—

1.—The Appliances for which the Drainage of Houses and the Sites of Habitations and Towns, and the Removal of Refuse Matters are effected; as:—

- House drains, and the machinery for their construction.
- Water-closets, and the machinery connected with them.
- Earthenware pipes, sewers, and gully-shoots.
- Traps for preventing the escape of effluvia from sewers and house-drains.
- Urinals of earthenware and iron.

2.—The Appliances for the Distribution of Water into Towns and Houses:—

- Iron mains, with the new glazes and means for the protection of the metal from the action of water, or of water from the action of water.
- Earthenware pipes for collecting and leading water into towns, and distributing it.
- Pipes of iron, tin, or lead, or other metal, for the distribution of water into houses, with the means of protecting the water from the action of the metals.
- Earthenware pipes which have been used for the same purpose in Switzerland, France, and Germany.
- Taps or cocks, and valves used for the distribution constant supplies of water into houses of high-pressure; self-closing taps for the prevention of the waste of water.
- Water-meters, for regulating the sale of water.
- Apparatus for the purification of water; filterers of earthenware or of glass; sand and charcoal filters.
- Bath apparatus; public and private shower-bath.

3.—Apparatus for Warming Houses; and for Cooking and Clothes Washing.

- Fire grates for cottages and for houses of various grades, with their warming power with given quantities of coal noted.
- Smoke consuming kitchen ranges of various species.
- Kitchen boilers and domestic washing apparatus.
- Apparatus for warming houses by the distribution of hot water.
- Stoves for warming houses, by descending flues conducting hot air through hollow floors and walls.
- Chimney flues of earthenware pipe flues, as well as iron, ornamental as well as plain.
- Appliances for *cooling* houses and dwelling rooms in very hot weather.
- Refrigeratory apparatus.

4.—Apparatus for Ventilating Houses and Buildings.

- Syphon ventilators.
- Chimney valves.
- Window valves.
- Air pumps, on a large and a small scale.
- Blowers or pumps for driving in pure air. Pumps for extracting vitiated air.
- Anemometers for regulating the removal of air.

5. Apparatus or Materials for the Prevention of Damp and Cold in Houses.

- Walls, floors, and roofs—hollow and non-absorbent bricks, pots, and tiles for their construction.
- Glazed pottery and non-absorbent surfaces for walls.
- Apparatus for the prevention of the escape of heat, or for protection from cold through windows.
- Double windows.
- Thick window glass for cottages.

6.—Apparatus for the service of the Sick in Houses; and Hospitals for the removal of the Sick.

- An exhibition of special cottage furniture and appliances.
- Huts, tents, and model cottages of various material, with furniture for emigrants or new settlers, or navvies.

BISHOP WATSON AND THE ELECTRIC TELEGRAPH.

By Dr. Hamel, of St. Petersburg.

At the Telegraph *Soirée*, which took place in September last at the Free Trade Hall at Manchester, during the meeting of the British Association for the Advancement of Science, Mr. W. R. Grove, F.R.S., well-known as the inventor of one of the forms of a voltaic battery, addressed the numerous assembly, and gave a sketch of the history of the rise and progress of the electric telegraph.

He began by repeating the statement made by some authors, that Bishop Watson had given the first idea of an electric telegraph.

Now, as the said Bishop never in the least occupied himself with electric telegraphy, I think it right to explain so great an error, especially as I have already, some years ago, given an account of the incorrectness of such statement to the Imperial Academy of Sciences at St. Petersburg.

In 1744, Dr. Ludolf, at Berlin, had found that, by the electric spark, sulphuric ether could be ignited; and soon after Professor Winkler, at Leipzig, succeeded in also kindling alcohol, and even common proof spirits.

These experiments excited at the time no small surprise. An account of them, translated from Winkler's description, was, in November of the same year, communicated to the Royal Society in London.

Mr. William Watson, an apothecary, having a shop in Aldersgate-street, who had been since 1741 a Fellow of the Society, undertook to repeat what had been done at Berlin and Leipzig.

He constructed for the purpose a rather rude electrical machine, with glass globes or tubes, to be rubbed against leather cushions, the conductor being sometimes a common poker, sometimes a gun-barrel, suspended by silk cords.

In March, 1745, he was able to announce to the Royal Society that he had succeeded in igniting ether and alcohol by sparks drawn from his poker, and the Society voted him, before the end of the year, the Copleyan Medal.

In October of the same year, the Dean of the "Domcapitel," at Kamin, in Pomerania, Prelat Kleist—whom Dr. Lardner erroneously calls a monk at Leyden—had found that the electricity from a conductor could be collected in a glass containing some water, into which a nail had been placed upright; and in the year following (1746) it became known that Musschenbroek—quite independently of Kleist's prior discovery—had made flasks for the accumulation of the electric fluid. A wire went through

the cork to the water in a bottle. As this had taken place at Leyden, flasks for the accumulation of electricity have since, not justly, been called by the name of that town —Leyden jars.

Hardly had Kleist's and Musschenbroek's bottles become known, when Professor Winkler, at Leipzig, tried to discharge them through a certain distance of water, which he did in the river Pleisse, in Reichel's (then Appel's) garden. Dr. Le Monnier, at Paris, did the same at greater distances through the water of the basin in the garden of the Tuileries.

The apothecary Watson, in London, who had, as we have seen, got a machine made to repeat the ignition of inflammable fluids by sparks from the conductor, undertook, in 1747, to repeat also the said experiments made on the Continent, to discharge Leyden flasks through water.

He discharged bottles containing, instead of water, iron filings, and being, by the advice of the astronomer, Dr. Bevis (who was Secretary to the Royal Society), externally covered with a thin sheeting of lead, first in London, through the river Thames, near Westminster-bridge, over which, to complete the circuit, a wire was laid, and subsequently out of London, in the so-called New River, near Stoke Newington, through much greater distances of water. He also discharged, near Shooter's-hill, Dr. Bevis's jars through nearly two miles of wire, suspended on wooden sticks, the current having to return to the outer covering of the jar through the soil.

So William Watson has proved that the electric current from a Leyden jar will travel through considerable distances of water as well as earth, and along wires suspended in the air on sticks. But he never had an idea of applying his experiments to telegraphic purposes.

He wrote in 1746, after having communicated to the Royal Society the results of his first (igniting) experiments: "If it should be asked, to what useful purposes the effects of electricity can be applied, it may be answered, that we are not yet so far advanced in these discoveries as to render them conducive to the service of mankind." He adds, "Future philosophers may deduce from electrical experiments uses extremely beneficial to society in general." Nor did Watson, when in the year following he made the discharging current of electricity from a Leyden jar pass through certain distances of water, wire, and earth, entertain the slightest idea of applying this to telegraphic purposes. But, notwithstanding that, it has been lately stated in print, "Dr. Watson, of England, was the first to propose the construction of an electric telegraph, in 1747."

William Watson's favourite study had always been botany; through it he had gained the esteem of Sir Hans Sloane.

I have, in my "Tradescant," mentioned that Watson, in 1749, visited, with Dr. Mitchel, the locality in South Lambeth, where Tradescant, the father, in the beginning of the seventeenth century, had established his well-known garden. He rejoiced to find some exotic plants still there, that had been introduced by the said Tradescant.

In 1754, Watson was charged by the Royal Society to communicate to Dr. Lining in America, who had occupied himself with experiments of conducting lightning from the clouds, some details about Professor Richman's melancholy fate at St. Petersburg. This martyr to science was, as is well known, in 1753, killed by a flash of lightning whilst looking at the index of the apparatus for observing the atmospheric electricity, which was connected with a conductor placed on the roof of his house.

We see here that William Watson also paid attention to the drawing of sparks from the clouds, as he had done previously from the poker of his electrical machine, but he ignored the existence of a sort of telegraphic apparatus, working by frictional electricity, which had been made at Renfrew in Scotland, in the very year in which Richman at St. Petersburg was killed by a flash of lightning.

In 1757, Watson received from the German Universities of Halle and of Wittemberg, diplomas as Doctor. Hence he is, in describing his previous electrical experiments, sometimes called Doctor, though at that time he had not that degree. In 1759, he began—rather late—to apply himself to the study of medicine, and, in 1760, he was appointed Physician to the Foundling Hospital in London. A year before his death, which took place in 1787, King George III., before whom, as young Prince of Wales, he had experimented with his electrical machine, conferred on him the order of Knighthood, on the occasion of a congratulatory deputation. So he died as Sir William Watson.

The Christian name of that Watson, who in 1816 died as Bishop of Landaff (in South Wales, not, as has been printed at Paris, in Ireland), was Richard. He was born in 1737, at Heversham, near Kendal, in Westmoreland.

In 1745—1747, when the apothecary, William Watson, was making his electrical experiments in and near London, Richard was, at the place of his birth, a boy frequenting the grammar school, of which his father had been nearly forty years head-master.

Having lost his father in 1753, he was in the following year sent to Trinity College, Cambridge, of which he was elected a Fellow in 1760. He took the degree of Master of Arts in 1762.

In November, 1764, he was elected Professor of Chemistry. He has described this in the following words:— "At the death of Dr. Hadley I was unanimously elected by the Senate, assembled in full congregation, Professor of Chemistry. An eminent physician of London had expressed a wish to succeed Dr. Hadley, but on my signifying to him that it was my intention to read chemical lectures in the University, he declined the contest. At the time this honour was conferred upon me I knew nothing at all of chemistry, had never read a syllable on the subject, nor seen a single experiment in it."

By great application, Watson was enabled, after about fourteen months, to begin his lectures. Subsequently he wrote several papers, and his "Chemical Essays," in five small volumes, have been more than once reprinted. In 1769 he was made a Fellow of the Royal Society.

In 1771 he was, on the death of Dr. Rutherforth, elected to the office of Regius Professor of Divinity, although by his own account he seems to have been hardly better prepared for the chair of Divinity than he was for that of Chemistry seven years before.

In 1782, he was promoted to the Bishopric of Landaff.

Without mentioning his numerous religious and other publications, nor the sinecures and other very lucrative situations given to him, I conclude by stating that, although the brilliant discoveries of Galvani, Volta and Davy were made in his time, and although he survived Soemmerring's invention of the galvano-chemical telegraph by seven years, and Baron Schilling's exploding powder mines by galvanic electricity across the river Neva by four years, he never in the least attended to electricity and electric telegraphy. In his writings the word Electricity does not occur a single time. Notwithstanding this, however, he has just been held out to the British Association for the advancement of Science, as the person who gave the first idea of an electric telegraph.

Let us hope that a similar assertion will never again be repeated. Bishop Watson's name has no right to appear in the history of the electric telegraph.

THE SANITARY CONDITION OF THE CITY.

On Tuesday, 22nd inst., Dr. Letheby, the Medical Officer of Health, presented his report to the Commissioners of Sewers on the sanitary state of the City of London, for the summer quarter of the present year, ending the 28th of September. Of this document the material portions are subjoined:—

"The number of births registered in the city during the quarter is 839, and of deaths 640. Both of these present a marked improvement in comparison with the

average of the last six years; for the former has advanced from 820 to 839 in the quarter, and the latter has declined from 683 to 640. The chief increase in the proportion of births has been in the Western district, where the number has been raised from an average of 186 to 218. In the three districts of the City the annual birth-rate has been 29·6 per 1,000 of the entire population. In all England the annual birth-rate for the summer quarter is 32·8 per 1,000. Of the 640 deaths in the quarter 264 occurred in the Eastern Union, 163 in the Western, and 213 in the Central or City Union. These numbers are in the annual proportion of 25·9 per 1,000 of the inhabitants of the first-named district, 24·0 per 1,000 of the second, and 18·7 of the third, the death-rate of the whole city being 22·5 per 1,000. In all England the death-rate in the summer quarter is 20·4 per 1,000, and in the districts of the chief towns of England it is 23·8. While, therefore, the average proportion of deaths in the whole of the city has not been unusually large, that of the Eastern division of it has been excessively so; and in the Cripplegate sub-division it has amounted to 29·8 per 1,000 of the inhabitants. The density of the population in this district is enormous; it amounts to 290 persons upon an acre; whereas in the whole of the city there are but 156 persons to an acre, and in all London but 36. This accounts for the excessive mortality of the Eastern division of the City, and shows, in connexion with the poverty of the district, the difficulties which have to be surmounted in improving its sanitary condition. Of every 100 deaths 45 have occurred among children of less than five years of age; nine among young persons at from 5 to 20 years of age; 10 at from 20 to 40; 16 at from 40 to 60; and 20 at 60 and upwards. The mortality among infants is rather large, for in the rest of England it is only about 41 per cent. of the total deaths. Contrasted with the averages of the last six years, there has been a falling off in the proportion of deaths from several important diseases, as continued fever, scarlet fever, smallpox, and measles. These have declined from a total average of 81 in the quarter to 39. Continued fever has fallen from 29 to 18, scarlet fever from 25 to 18, smallpox from 10 to 1, and measles from 17 to 2. Some other forms of disease, however, have advanced; thus, whooping-cough, croup and diphtheria have been increased from 28 to 43, and inflammatory affections of the lungs from 54 to 63. Altogether the number of deaths from zymotic affections has been reduced from an average of 179 in the quarter to 155, while that from tubercular diseases has increased from 154 to 163. Diphtheria and croup have been rather severe, but there have been no specialities in the origin and development of these diseases to lead to any conclusion in respect of the laws of their progress or the means for their abatement. The laws which govern these manifestations of disease have yet to be discovered, and this is one of the aims of sanitary investigation. At present we merely recognise the fact that these maladies are affected by local circumstances, and are, as it were, intensified by filth and overcrowding, and such like unwholesome agencies; but we have yet to ascertain what are the real influences concerned in their propagation, as well as the particular agencies which originate them and determine their speciality. The meteorology has been deduced, as usual, from the observations at Guildhall, under the superintendance of Mr. Haywood. The mean temperature of the quarter has been 60 deg., which is the exact mean of the corresponding period of the last 43 years. The highest point which the thermometer reached was 85 deg., and the lowest 45·8 deg. The former was attained on the 12th of August, when at Greenwich the thermometer stood at 89·3 deg.; and the latter was on the 27th September, when at Greenwich it was 37·7 deg. These, as well as other observations, show that the temperature in the City is more uniform than it is at Greenwich. The greatest daily range of temperature has been 23·4 deg., and the average of the ranges 19·3 deg. The diminished rainfall has influenced the condition of the river; for the proportion of solid matter has risen from an average of 33·8 grains per gallon (that of the preceding quarter) to 128·7 grains; of this nearly 9 grains were organic matter, and 93 were sea-salt. The condition of the water has been rather offensive, and it has shown a tendency to active decomposition, nothwithstanding that the temperature of it has not exceeded 67·5 deg. In the autumn quarter of 1859 there was nearly the same state of the water, as regards its appearance, its odour, and its chemical composition. At that time the rainfall amounted to only 5·5 inches, and the temperature to 71·3—conditions which are very nearly similar to those of the past quarter.

"Touching the sanitary work of the quarter, 1,404 houses have been inspected and 852 visits made to the common lodging-houses of the city. These have resulted in the issuing of 596 orders for sanitary improvement. Of the visits of inspection 511 were made in consequence of the existence of diarrhœa among the inmates of the houses, and 46 because of fever. The markets and slaughter-houses have also been duly inspected, and the officers have seized 21,706 lb., or about 9½ tons of meat as unfit for human food. 17,958 lb. were seized in Newgate-market, 1,543 lb. in Leadenhall, and 2,105 lb. in Aldgate. Of these, 5,439 lb. were putrid, 10,827 lb. were diseased, and 5,440 lb. were from animals that had died from natural causes. The seizures consisted of 98 sheep, 35 pigs, 1 calf, 150 quarters of beef, and 130 joints; besides which there were seized in Leadenhall-market, on account of putridity and death from natural causes, 184 fowls, 67 rabbits, 256 ducks, 102 pigeons, 17 hares, and 18 haunches and quarters of venison. All of it was sent to the boilers and destroyed as food. The water from 12 of the city pumps has been analysed during the quarter, and the results, as in the former cases, show an enormous amount of saline and organic impurity. Altogether there have been 34 of the city pumps examined, and in every case the water has been fouled by surface drainage. There is not one of these pumps that derives its supply from the deep strata of the London basin; and, excepting the pump in Glover's-hall-court and that in Guildhall-buildings, none of them furnish water that is fit for domestic purposes. At the best of times some of them yield water which contains from 100 to 130 grains of saline and organic matter in the gallon, and all of them are excessively hard from the altered products of decomposition. The knowledge of the composition of the soil through which the water passes should warn us of the danger that may at any moment arise from its use. It may be that it has often been drunk with impunity, and that it has rarely shown any immediate manifestation of its morbific action; but it cannot be that the products of corruption can be constantly admitted into the human body without danger of insidious mischief, and there is the still greater danger of the impurities of the soil passing unchanged into the water, and being a source of quick and certain injury. The water from the city wells is constantly changing—in fact it is hardly the same from hour to hour; for the soil through which it passes is pierced in every direction with drains and sewers, and is charged with every species of corrupting refuse, which passes in variable proportions into the porous strata from which the water is pumped. This ought to tell us not merely of the disgusting nature of the supply, but also of the dangers which lurk within it. Experience has shown that wells like these are liable at any moment to receive the leakings from a cesspool or a sewer, and thus to be the immediate cause of fatal disease. In the autumn of 1854 there was a sudden and serious outbreak of cholera in the parish of St. James's, Westminster. The course of the disease was confined to a small area in the neighbourhood of a favourite pump in Broad-street; and soon it was remarked that of 73 persons who died during the first days of the visitation, 61 had been drinking the water of the pump. It was also remarked that among persons who were living in the same street, and occasionally in the same houses, those

only were attacked who drank the water of the favourite pump; in fact, in a number of cases which were particularly investigated, it was ascertained that persons who lived at a distance from the parish, and who had the water sent to them because of its supposed goodness, were seized with cholera and died. A full inquiry into the circumstances of the matter proved that the well had become charged with cesspool drainage, and had thus acquired its poisonous action. Again, in the cholera visitations of 1848–9 and 1853–4 there were two striking examples of the influence of such water in the propagation of disease. The Southern districts of London, comprising nearly a fifth of the population of the metropolis, were visited most severely with cholera at both of those outbreaks, and the persons who suffered most on each occasion were those who drank the worst quality of water. The inhabitants of those districts are supplied by two rival companies, who obtained their water from the Thames at different parts of its course. In one case the water was charged with a larger amount of organic matter than in the other; and, although the conditions of the population were in every other respect the same, yet this had the effect of augmenting the mortality to a frightful extent. In the second visitation of the disease the circumstances of the supply were changed, the water of the old company, which was once the worst, was then the best, and the severity of the disease was changed likewise; for those who partook of the still bad supply suffered as before, and their mortality was three and a half times greater than their neighbours. The town of Newcastle-upon-Tyne was supplied with comparatively pure water in the year 1849, and then it suffered but little from cholera, whereas, in the visitation of 1853, when there was so calamitous a loss of life from this disease, the water supply was made impure by the drainage from the sewers. The same effect was the result of the same cause in Hull, in 1849, and other examples may be cited, in which the converse happened, as at Exeter, where the inhabitants, after having suffered severely from cholera in 1852, obtained pure water, and escaped its ravages. Nor are the percolations from the graveyards of a city less injurious; experience has demonstrated that this also is a prolific source of disease. Sir James Macgregor relates that when the British army was in Spain, about 20,000 soldiers were buried in a rather small space of ground; this was done in the course of two or three months, and soon the troops who drank the water from the wells of the neighbourhood were attacked with dysentery and malignant fevers. The cause of the mischief was clearly traced to the hardly recognizable impurity in the water from the shallow wells. Here, however, in the churchyards of this city, there are the remains of ten times such a buried army undergoing decay; and in the whole of this metropolis, in a space of not more than 218 acres of soil, there were buried not long since as many as 50,000 dead in the year. In a generation of thirty years this would give us 1,500,000 of decomposing bodies in the surface soil of London, and through these the water percolates to find its way into the porous stratum which supplies the shallow wells. At best, the change of this corruption is but imperfect, and the presence of ammonia and saltpetre tells of the process of decay, and indicates the dangers which accompany it.

"All these considerations have forced upon Dr. Letheby the conclusion that water from rivers and surface wells, contaminated with the refuse of drains and the soakings from graveyards, is unfit for public use.

UTILIZATION OF SEWAGE.

The following letter has been addressed to the Editor of the *Times*:—

"Sir,—I rejoice to be able to tell you that considerable progress is being made in the application of town sewage to the production of food.

"At the Earl of Essex's estate, Cashiobury, I yesterday saw a stream of sewage from Watford applied with much profit to the soil, as proved by the enormous crops of roots, rye-grass, and other productions.

"The sewage of Wimbledon now flows over 20 acres of land in Wimbledon-park, and that portion on which it was applied in the spring has produced luxuriant and remunerative crops. The cost of preparing the land for its reception by gravitation is only between £3 and £4 per acre. At the Colney Hatch Lunatic Asylum the sewage is being availed of, and I am happy to say that the governing powers of various lunatic asylums, pauper unions, prisons, and charitable institutions, are considering this important question.

"The sewage of some 25,000 people at Croydon is flowing by gravitation over 300 acres, a spirited and close calculator from Essex having rented the land at a high rental for a long term. Altogether, it is refreshing to think that we shall soon see our exhausted fields replenished with fertility by the sewage of our towns.

"The great sewers of the main drainage are sufficiently high above-ground to permit a most extensive irrigation from them by gravitation, at a very small cost for preparing the land.

"I am, Sir, your obedient servant,

"J. J. MECHI.

"4, Leadenhall-street, Oct. 22."

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS.

(*Continued from page* 782.)

Sugar of the Phillippine Islands.—The unclayed sugars of the Phillippines in ordinary times, even with the present defective, and consequently expensive mode of manufacture, are held to be the cheapest in the world. At present, the only Europeans engaged in the cultivation of sugar in this quarter, are a Spanish and a French planter at Isla de Negros (the latter of whom produces an excellent sugar, which always commands upwards of a dollar per picul more than ordinary Iloilo), and a French planter in this province, who has lately commenced on a limited scale.

Sapanwood.—Sapanwood is exported in considerable quantity from the province of Iloilo. It is chiefly produced in the vicinity of the southern coasting towns, Giumbal, Nuagao, and San Joaquin (the farthest within 20 miles of Iloilo), from whence the greater part is brought round by sea to Iloilo for exportation to Manila, and the rest shipped west from Giumbal. The large quantity of this dyewood shipped (mostly to Europe and the United States) from Manila is generally taken at a comparatively low freight in lieu of dunnage; but a considerable portion, both of straightwood and roots (the latter of which are used in China and at Calcutta), is sent on yearly to Singapore and Amoy, and forms the bulk of cargoes of such vessels as load at Manila for the former port. One of the shipowners of Iloilo has it in contemplation to place a vessel of 300 tons, now about to be constructed here, in the Singapore trade, *i.e.*, to leave this for Singapore direct with sapanwood and other articles, and return with a freight of piece goods and other effects for the Manila and Iloilo markets. The quality of the Iloilo sapanwood would be much better were the natives to abstain from the practice of cutting down a large proportion before the trees are sufficiently grown. When allowed to obtain its proper development, it is said to be equal or superior to that of Misamis and Bolinar, at present the best qualities brought to the Manila market. As both settlers and brokers endeavour to deliver the wood as soon as practicable after it is cut, the loss in weight on the voyage to Manila is said to be sometimes as much as 12 to 14 per cent. The present price of sapanwood delivered at Iloilo is, with the addition of 25 per cent. for cost of silver, 1 dollar 8 cents per picul against the Manila rate of 1 dollar 75 cents to 1 dollar 87½ cents, leaving a considerable

margin in favour of vessels loading here for a foreign market. The freight to Manila is 31¼ cents per picul.

Gutta Percha.—Some quantity of this valuable substance has been sent from hence (Iloilo Phillippine Islands) to Manila; but, either owing to adulteration, or ignorance of the proper mode of boiling, it has not obtained an encouraging price. I have sent samples of the best I have been able to procure to Singapore, for analysis and report, and am expecting a memorandum of the proper mode of boiling. The tree called by the Bisayas "nato," yielding it, abounds in this province and at Guimaras, and if it prove to be the real Isonandra Gutta of the Straits and Borneo, should hereafter become of considerable importance. The monopoly of shipment from Manila has an injurious effect on the production of this article.

Roads.—The Port of San Nicolo, in the eastern part of the Island (Crete), and the centre of a very fruitful district, is to be made a loading port, which will be a great advantage to the agricultural population of that district. A good carriage road has been made from Canea to the Bay of Suda; similar roads are to be made in various parts of the Island. An English civil engineer has been for some time past engaged in making the necessary surveys. The population has offered to work nine days per annum towards the construction of the roads. It was in this manner that they were made in the Ionian Islands. Carts have been introduced from Malta, and it is hoped that the inhabitants will gradually get into the habit of using them when practicable.

English Mining Establishment on Mount Pelion (Volo), Turkey.—The geological formations of the Pelion range generally consist of primitive clay, slate, and limestone, the former being the basis of the grand formations of the country, and in them the mineral veins lie very numerous, running from east to west (magnetically). The first firman that was issued for the working of the lead and silver mines, discovered by an Ionian (Mr. A. Cazotti), in the district of Volo, in the year 1848, was granted by the Sultan to Izett Pasha, the present minister of police, for a term of eleven years. Izett Pasha, after working a few of the mines on his own account for three years, gave up the enterprise, which, on account of gross mismanagement and peculation on the part of the persons employed by him, Turks, Armenians, and Greeks, proved unsuccessful; and, in 1854, he assigned his rights to Messrs. Edmund Leahy and Charles Grace. A second firman was recently obtained, extending the privileges of the first, for a term of thirty-one years—from 1856 to 1887. The Sandjacks (provinces) of Tricalla and Joannina, as mentioned in the Sultan's concessions, or firmans, embrace the entire of Thessaly, a greater portion of Lower Albania, and a section of Macedonia—the whole covering a superficial area of about 20,000 miles, many sections of which are well known to be rich in mineral deposits of gold, silver, lead, copper, iron, antimony, arsenic, and coals. Messrs. Leahy have the exclusive privilege of working all, on the annual payment of 70,000 piasters into the Sultan's privy purse, equal to £600, in lieu of all royalty, customs dues, and other taxes. The district possesses many advantages for the export of minerals, having a great extent of sea-board both in the Adriatic Sea and in the Ægean Sea, or Grecian Archipelago. The boundary in the Adriatic Sea comprises 200 miles in length, northwards, extending along the sea coast from the Gulf of Arta, past the Island of Corfu, to within a short distance to the town and harbour of Durazzo in Albania. The boundary in the Grecian Archipelago, or Ægean Sea, embraces about 150 miles of sea coast, from the Gulf of Volo to Catterina in the Gulf of Salonica. The present proprietors of the firmans commenced and completed extensive works along this latter coast, on the eastern slopes of Mount Pelion, and about three-quarters of a mile from the sea. They have expended from £40,000 to £45,000 on those works, which are now actively and profitably occupied in dressing and smelting the rich ores of Galena, numerous veins of which have been discovered in Mount Pelion, and from which considerable quantities of lead, silver, and gold, are extracted. The buildings where the ore is smelted are called "Pelion Works." They include the following mechanisms and compartments:—A wheel, on a new principle, driven by the pressure of a column of water introduced at the upper extremity of a tube, with a fall of sixty-four feet. The water is conveyed through an artificial course, and never fails at any season of the year. The wheel, at present worked to only fifty horse-power, drives the fan-blast; and the surplus water runs down a trombe, which likewise supplies air for the furnace blasts. The furnaces are thus well supplied with air; and the gases evolved in the different processes of smelting and refining the metals are condensed in a long flue terminated by a high chimney, which renders the establishment healthy, and entirely prevents the ordinary illness to which such works are subjected. The wheel likewise drives several stampers where the inferior description of ore is pounded up in water, and is, by repeated operations, reduced to the condition of the finest sand, from which the muddy particles are removed by washing in pans or trays. There is a circular saw which is set in motion at pleasure, and it is most useful in cutting up timber into planks. There are various description of furnaces: three, resembling ovens, are used for roasting the ore preparatory to its being smelted at the ore hearths, of which there are six. Here the ore is treated with charcoal and lime, and the liquid metal is collected in the bottom and overflows into a pot placed in front; a portion of ore concretes and becomes slag, which undergoes a different treatment in the cupola furnace. At the ore hearths, the mixed metal is run into moulds and carried to the separation-house, where there are eight iron pots with heating grates underneath. Here the mixed metal undergoes the crystallizing process, invented or improved by Patterson, which has the effect of purifying the lead, and of the residue forming a separate amalgam, containing a very large proportion of silver. This amalgam is then transferred to the cupellating furnaces, where the lead is blown off in the form of litharge, and a cake of pure silver containing gold is formed. There are also large stores for charcoal, which is easily and plentifully supplied at less than half the cost of coal. Within a few hours of the works, there are extensive forest lands which supply large quantities of fuel, at a cost of 1s. 6d. the load of firewood, equal to 300 lbs. weight; and 4s. for the charcoal load. The foremen smelters, refiners, and miners, are all English—besides a few Germans, Swiss, Poles, and Ionians. They are well paid: some at £15 and others at £12 per month. In the smelting, refining, and other departments of the Pelion Works, a considerable number of native Greeks are employed. Lads of twelve to fifteen years of age are generally selected. They conduct themselves well, are very intelligent, and hard-working. Their pay varies according to age and service, from 6d. to 1s. per diem. Those employed in the working of the mines, under the superintendence of Englishmen and foreigners, are all natives. They are paid from 6d. to 3s. per day. Native workmen are plentiful, and labour comparatively cheap to what it is in other countries. Living and house-rent are also cheap. The company have from 350 to 400 men and boys in their employ—more than 200 of whom hold permanent situations. They are all generally well conducted. Now and then, disorders, arising out of drunkenness, take place; but the guilty parties are either dismissed or fined, or else submitted to a decrease of pay. On the whole, the establishment is kept in perfect order and under a judicious but not too severe system of discipline. The mines are all properly worked, ventilated, and drained; and the galleries solidly constructed—accidents therefore rarely happen. The climate is good, and the locality in which the works are situated very healthy. Of all the foreigners that are employed, only one Englishman died, his death being caused from excess of drinking. Some of the ores of Galena, in the mountain, are very rich—yielding, I am told, as much as 82 per cent. The

minerals are not, however, equally rich. The veins vary in breadth from ten to two feet, and, on an average, yield about 32 per cent. of mixed metals, consisting of gold, silver, and lead. The gold and silver is refined in the establishment to such a high degree, that not more than two parts in a thousand of any foreign matter can be detected, and the lead is admitted to be of the very best quality. There are at present considerable quantities of lead in pigs, and several large ingots of silver and gold ready for shipment. Hitherto the silver and gold had been sold to the Turkish Mint, but it is the intention of the proprietors to send to England, as a trial, what is now ready. The Pelion Works, when in full operation, are capable of yielding from nine to ten tons per day of mixed metal, combining gold, silver, and lead; and of separating the gold and silver from the lead. The mixed metal is worth, on an average, about £50 per ton; and taking ten tons per day, the value of the metals which can be produced from only a small angle of Mount Pelion will be £500 daily. Communication between the different mines and the Pelion Works, some of which are situated about six hours from them, is difficult. The ore is carried on mule-back over the mountains by winding footpaths through valleys and forests. In autumn, the mountain torrents, swollen by the rains, often put a stop to communication for two or three days; and in winter there is a similar hindrance from heavy falls of snow. From the works to Khorefto, the roadstead of Zaghorà, the principal village on the eastern slopes of Mount Pelion, the distance is about three-quarters of a mile. The lead and silver is carried down on mules, and there shipped on board of Greek vessels for Salonica, from whence it is re-shipped to Constantinople, &c. The roadstead is difficult and dangerous for shipping, especially during winter. It is also exposed, and the Pelion Works too, to an attack from pirates, in consequence of its proximity to some of the Greek Islands. The establishment is also open to attacks from brigands; but, in concert with Mr. Consul Calvert, I obtained a force of police from the authorities for the immediate protection of the proprietors, their workmen, and property. The force is composed of twenty-five men, twelve of whom are Greeks and thirteen Albanians, under the immediate orders of the proprietors. They are all picked and trustworthy men; and, besides the pay and rations they receive from the authorities, the proprietors make them an equal allowance; in this manner they get double pay. They have been found hitherto very obedient, faithful, and well-behaved; and they, besides, make themselves generally useful. At the request of the proprietors, both Mr. Calvert and myself thought fit to demand an increase to this police force; and I am happy to say that the authorities, although they put forward difficulties at the beginning, are now disposed to raise the force to fifty effective men. The establishment being yet in its infancy, it would be difficult to specify the extent of the profits that are realised; nor am I able to ascertain, with any accuracy, the relative amount or value of the metals that have been extracted and shipped. But, basing my calculations on the scale on which operations are now conducted —and they are comparatively limited—as well as on the information I have obtained from the proprietors, I should say, approximately, that twenty tons of mixed metal are run every week. The ton of lead yields from 60 to 160 ounces of silver and gold amalgam, the value of the gold being estimated as equal to that of the silver with which it is combined.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, October* 18*th*, 1861.]

Dated 8*th June*, 1861.

1457. H. Du Mont, 150, Rue de Rivoli, France—A photographic apparatus, having for object to reproduce the successive phases and shiftings of a motion.

Dated 11*th July*, 1861.

1747. P. Adie, Strand—Imp. in apparatus in connection with railway carriage buffers, for preventing damage in cases of railway collision.

Dated 1*st August*, 1861.

1917. G. Edwards, 4, Park-road villas, Battersea—Imp. in means and apparatus for propelling by traction carriages and other vehicles on railways, tramways, and other roads.

Dated 3*rd August*, 1861.

1927. G. F. Jones and J. Jones, York—Imp. in apparatus for protecting and arranging water pipes, and withdrawing water therefrom, and preventing injury thereto by frost.

1935. W. E. Newton, 66, Chancery-lane—An improved process for producing colouring matters or pigments from manganese. (A com.)

Dated 5*th August*, 1861.

1941. E. D. Johnson, Wilmington-square—An imp. in the construction of centre seconds watches.

Dated 17*th August*, 1861.

2051. P. Hart, Hampton-wick—An imp. in mills for grinding.

Dated 20*th August*, 1861.

2069. S. Whittaker, Haverstock-hill, and R. A. Jones, Aylesbury—Imp. in operating upon railway signals, and in indicating their position by means of electricity.

Dated 26*th August*, 1861.

2122. H. Nelson, Manchester, J. Carr, Blackburn, and G. Harrison, Burnley, Lancashire—Imp. in self-acting mules for spinning cotton and other fibrous materials.

Dated 28*th August*, 1861.

2146. J. Duncan, Greenock—Imp. in the manufacture of sugar, and in the apparatus employed therein, also in the apparatus employed in reburning animal charcoal.

Dated 30*th August*, 1861.

2155. L. D. Owen, 481, New Oxford-street—Imp. in ploughs. (A com.)

Dated 31*st August*, 1861.

2169. W. Hensman, Woburn, Bedfordshire, and W. Hensman, jun., Linsdale, Buckinghamshire—Imp. in apparatus for tilling land by steam power.

2176. E. J. Hughes, 123, Chancery-lane—An improved apparatus for collecting the gases which escape from furnaces. (A com).

2178. W. A. Gilbee, 4, South-street, Finsbury—Imp. in the process and apparatus for the manufacture of steel. (A com).

2180. W. Fox, Amiens, France—Imp. in parasols and umbrellas. (A com.)

2182. F. Curtis, Bilston—Imp. in forming or shaping the top or upper parts of boots from woollen and mixed fabrics.

Dated 4*th September*, 1861.

2198. A. White, Great Missenden, Buckinghamshire—An improved apparatus for stopping railway trains.

Dated 6*th September*, 1861.

2231. J. Brown, Burnley—Certain imp. in power looms for weaving.

2233. E. Harrison, and T. S. Yates, Oldham—A certain compound or certain compounds to be used as a substitute for gunpowder.

2234. M. Henry, 84, Fleet street—Imp. in apparatus for signalling on railways by means of electricity. (A com.)

Dated 7*th September*, 1861.

2236. E. Taylor, Blackburn—Imp. in obtaining motive power by the combination and arrangement of levers and weights.

2237. W. Ainsworth, E. Heap, W. Fielding, and E. Openshaw, Adlington—Certain imp. in power looms for weaving.

2238. N. D. P. Maillard, Dublin—Imp. in the material and preparation of the material and apparatus for making potash, pearlash, and caustic potash of commerce.

2241. J. Holland, Manchester, and G. Okell, Ashton-under-Lyne—Imp. in apparatus by which an engine or train is made to give an alarm or signal at any required place on arriving at or passing any given point on the railway.

2242. H. Redgrave, Nottingham—Imp. in machinery for the manufacture of skirts usually called crinoline skirts.

Dated 9*th September*, 1861.

2246. W. Simons, Renfrew—Imp. in constructing ships or vessels.

Dated 10*th September*, 1861.

2256. T. S. Tyson, Leeds—The application of a self-acting lubricator to corves and waggons.

Dated 12*th September*, 1861.

2262. G. H. Birkbeck, 34, Southampton-buildings, Chancery-lane—Imp. in needles. (A com.)

2263. J. A. Dauncey, Manchester—Imp. in the manufacture of collars and wristbands.

Dated 13*th September*, 1861.

2272. W. Davis, Snow-hill, Birmingham—An improved apparatus for the prevention of accidents to vehicles drawn by affrighted horses.

Dated 14*th September*, 1861.

2292. F. Barnett, 60, St. Mary-axe—Improved automatic electric signals to prevent collisions on railroads and railways.

Dated 17*th September*, 1861.

2316. F. Barnett, 60, St. Mary-axe—An imp. in the light given by street and other lamps, by means of reflectors in white

earthenware, china, and all enamel materials in conjunction with an improved chimney to draw up the exhalations and smoke of all lighting materials.
2317. J. Eastwood, and J. B. Joyce, Bradford—Imp. in machinery or apparatus for combing wool and other fibrous substances.
2318. F. J. E. A. G. d'Olincourt, 113, Rue de Flandre, Paris—A new system of cultivating land, and for preventing the disastrous effects of inundations.

Dated 19th September, 1861.

2337. C. W. Eddy, 5, Chester terrace, Regent's-park—A new method of arming the bow of a ship of war with a shell and a beak to be fitted and unfitted at pleasure, and to be used conjointly or separately.
2344. J. Graham, 2, Anne-street, Devonshire-street, Commercial-road East—An improved double acting force or lift pump, for ships' fire-engines, and other purposes.]

Dated 20th September, 1861.

2352. H. Walter and D. Johnstone, Manchester—Imp. in castors.
2354. C. Perman, Salisbury—Imp. in machinery or apparatus for cutting and turning up the soil of land for cultivation.
2355. J. Burnand, 31, Netherthorpe-street, Sheffield—Imp. in the means of fastening or securing the handles of table knives and forks, daggers, and other similar articles.

Dated 23rd September, 1861.

2377. L. Jacob, Golden-square—Imp. in the mode of and apparatus for obtaining and treating hydrogen gas, and the application thereof to various purposes, parts of which imps. are applicable to the manufacture of iron and steel. (A com.)

Dated 25th September, 1861.

2388. C. G. Lenk, 24, Maddox-street, Regent-street—Improved pens.

Dated 26th September, 1861.

2399. D. J. Fleetwood, George-street, St. Paul's, Birmingham—An imp. or imps. in nails.
2401. H. Nunn, Chelsea—Imp. in mangles.
2403. G. Caldwell, Kilmarnock, and J. Y. Miller, Renfrew—Imp. in apparatus for dressing flour.
2405. S. S. Robson, Sunderland—Imp. in machinery or apparatus for raising or lowering heavy bodies.
2409. J. D. D. Passager, Paris—Imp. in lamps for burning palm or other similar fat oil.
2411. R. Davis, Splidts-terrace, Back Church-lane—Imp. in churns.

Dated 27th September, 1861.

2413. R. Franklin and G. Bacchus, 10, Chapel-street, Stratford—A reversable back-supporting nursing belt.
2417. D. McCallum, Greenock—Improved arrangements for filling and closing bottles and other vessels.
2418. S. Rowsell, Buckland St. Mary, Somersetshire—Imp. in horse rakes.
2421. G. J. Ganier and E. E. Collet, 12, Place de la Bourse, Paris—Imp. in envelopes.

Dated 28th September, 1861.

2423. W. N. Wilson, 144, High Holborn—Imp. in sewing machines and apparatus connected therewith.
2425. J. Reeves, New York—Imp. in electro-magnetic machines for obtaining and applying motive power.
2429. M. Theiler, Einsedeln, Switzerland—Imp. in telegraphs.

Dated 30th September, 1861.

2432. E. Funnell, 54, East-street, Brighton—A self-acting alarum which can be fixed on tenders, guards' compartments, or other parts of railway trains for preventing collisions.
2433. J. S. Bickford and G. Smith, Camborne, Cornwall—Imp. in the manufacture of safety fuzes.
2435. J. Lush, St. George's-square, Portsea—Imp. in mashing attemperators.
2436. C. H. Pennycook, Glasgow—Imp. in chimney hoods and ventilators.
2437. W. J. Christy, St. Albans—An improved method of mailing ships of war.
2441. P. A. F. Bobœuf, Paris—The preparation and application of certain new hemostatic and antiseptic agents.

Dated 1st October, 1861.

2443. J. A. Knight, 4, Symonds-inn, Chancery-lane—Imp. in the manufacture of boots and shoes. (A com.)
2445. R. Nightingale, Malden, Essex—Imp. in markers butts or mantelets.
2447. J. W. Scott, Worcester—Imp. in tools for the manufacture of leather and other rings, washers, and laces.
2449. W. S. Hogg, Rotherhithe-wall, Rotherhithe—Imp. in rendering columns, girders, doors, shutters, and other parts of buildings fire-proof.

Dated 2nd October, 1861.

2453. A. Wyley, Allsop's-place, Regent's-park—Imp. in fire-arms.
2461. E. Breffit, King William-street—Imp. in the manufacture of boxes or cases, and in machinery employed therein.

Dated 3rd October, 1861.

2463. J. C. Dickinson, Blackburn—Certain imp. in steam engines.
2464. W. T. Henley, St. John's-street-road, Clerkenwell—Imp. in magnetic and electric telegraph apparatus, which are also applicable to other purposes.
2465. J. C. Haddan, Bessborough-gardens, Pimlico, and C. Minasi, 3, Saint James's-terrace, Kentish-town-road—Imp. in the mode of discharging cannon, and in apparatus for facilitating the proper aiming with fire-arms.
2467. H. Law, 15, Essex-street, Strand—Imp. in machinery and apparatus for raising ships and other vessels out of the water for the purposes of examination, cleaning, or repair, some of which are applicable to the docking of vessels for the same purposes.
2470. T. Evans, Westmoreland-street, Westminster—Imp. in the manufacture of boots, shoes, and other coverings for the feet, and in the machinery, apparatus, and means connected with such manufacture.
2471. C. Mauvernay, Lyons—An improved method of signalling the passage of trains upon railways.
2472. J. Wood, Birmingham—Imp. in the manufacture of metal pens, and holders in tools employed therein, and in cards for carrying the same.

Dated 4th October, 1861.

2475. P. Knowles, Bolton-le-Moors, Lancashire—Imp. in machinery for opening and cleaning cotton and other fibrous materials.
2476. E. T. Hughes, 123, Chancery-lane—Imp. in the permanent way of railways. (A com.)
2477. C. Husson, Nantes—An improved process for silvering looking glass in piles of several sheets superposed without interruption, which process consists in the use of a chemical powder.
2479. J. Beesley, Coventry—Imp. in covering crinoline wire and other like substances.
2481. C. M. Elstob, Spalding, Lincolnshire—Imp. in buckets and portable water-cisterns.
2483. J. Pratt, Coventry—Imp. in shuttles for weaving ribbons.
2485. S. Icely, Kent-cottage, Byron-street, Bromley—An improved manufacture of gongs.
2486. J. Tweedale, Milkstone, Rochdale—Imp. in machinery for preparing and spinning cotton and other fibrous substances.

Dated 5th October, 1861.

2490. W. Rowan, Belfast—Imp. in cylinders or drums and beaters for machines for scutching and preparing flax and other fibres.
2491. P. O'Connor, Havertree, near Liverpool—Imp. in the construction of gas stoves for heating and warming.
2493. J. Turner, Upper Thames-street—An improved machine for mixing, mincing, and pounding.
2497. W. Squire, Upper Montagu-street, Bryanstone-square—Improved machinery for planing and shaping wood.

Dated 7th October, 1861.

2499. A. Chaplin, Glasgow—Improved combined winding engine boiler and cooking and distilling apparatus, including imps. also applicable separately.
2503. J. E. J. Sansum, Lower Kennington-lane—Improved machinery for mashing malt.

Dated 8th October, 1861.

2507. W. Catford, Chard, Somersetshire, and J. S. Wheatley, Nottingham—Imp. in the manufacture of bobbin net or twist lace.
2509. G. Glover, Lowestoft—Imp. in constructing fire-proof doors and window shutters.
2513. J. E. Grisdale, 53, Cheapside—Imp. in certain tickets or passes for railway and other purposes.

Patents Sealed.

[*From Gazette, October 18th*, 1861.]

October 16th.

953. B. Brown and R. Hacking.
955. R. A. Brooman.
962. P. Mingaud.
966. J. Ridley.
968. J. Ridley.
973. W. Hudson and C. Catlow.
979. J. Pinchbeck.
980. R. A. Brooman.
984. S. B. Haskard, J. Dean, and E. Dean.
994. A. Dugdale.
999. C. Carey.
1000. A. Henry.
1002. T. Y. Hall.
1006. P. Ward.
1016. E. Woodcock.
1017. F. J. Bramwell.
1020. G. D. Davis and J. Davis.
1022. J. Rhodes and R. Kemp.
1025. W. Wilson.
1035. W. Harris.
1039. S. Fox.
1051. F. C. Warlich.
1056. J. Dellagana.
1057. E. H. Joynson.
1065. G. G. Ray.
1067. G. M. Story and G. W. Edwards.
1071. J. Mash.
1077. H. J. T. Labat.
1079. J. Meyer.
1082. I. Hollis.
1097. W. Hoyle.
1101. W. Clark.
1117. W. E. Newton.
1132. G. Ager.
1146. S. Stevens.
1167. W. W. Harrison.
1250. A. V. Newton.
1566. M. McKay.
1681. H. H. Bishop.
1731. R. Hornsby, jun.
1742. R. Hornsby, jun.
1945. M. A. F. Mennons.
2059. W. Gossage.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, October 18th*, 1861.]

October 14th.

2316. A. Dunn.
2332. A. Allan, T. Whimster, and R. Gray.

[*From Gazette, October 22nd*, 1861.]

October 19th.

2351. J. M. Napier.
2401. G. M. Casentini and J. O. Barnard.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, October 18th*, 1861.]

October 14th.

2221. A. Illingworth and H. Illingworth.

Journal of the Society of Arts.

FRIDAY, NOVEMBER 1, 1861.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £435,500, have been attached to the Deed.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

This week the great point of interest at the works has been the eastern dome, of which the framework is now beginning to make some show on the outside of the scaffolding. The main columns which support the roof of the domes are constructed in four lengths, three 25 feet and one 20 feet long. As the whole column ascends externally without a break, it is necessary to bolt the lengths to one another on the inside. This operation is one of great difficulty and some danger, as, in order to complete it, a man has to be let down the iron tube, of scarcely 2 feet in diameter, and suspended from above while he inserts the screws. One of the windows on the north-western side of the dome, immediately above the galleries, is in its place, and another is ready to be raised.

The roof of the nave is finished to all but three bays of its entire length, and the glaziers are at work on the clerestory windows. The western dome-scaffold also is completed.

Materials are raised to the different elevations of the building by an ingeniously constructed steam hoist, which, by means of a series of signals made by coloured flags, is completely under the control of the workmen. Another machine on the ground, which is well worthy of inspection when at work, is the hydraulic ram with which all the girders are tested before they are put in the places destined for them. Of these the larger have been tested up to 38 tons, and the smaller to 20.

The fifty feet girders which span the south-western court, and bear its roof, are in course of being erected, and very shortly the whole of the court will be ready for the glaziers. This roof will be like the one of the Exhibition building of 1851, a series of ridges glazed all over.

The bricklayers are at work on the grand staircase, immediately inside the southern entrance, and the work for the refreshment galleries has been laid out and will commence forthwith.

A new feature of the works are the photographic cameras, which are to be found in all parts of the ground. The building, as it progresses, is being photographed from every point of view, and the results may be seen in the illustrated papers. The contract for photographing the works while in progress has been leased by Her Majesty's Commissioners to Messrs. Birnstingl, of Coleman-street, who again employ Messrs. Cundall and Downes, of Bond-street, as their photographers.

The applications for space from British exhibitors are now in course of being classified and methodized, a work of great trouble and difficulty. From the indistinct manner in which many intending exhibitors describe their goods it is sometimes very hard to fix the class to which they belong. After making allowance for duplicate applications, it is understood that the number of applicants in Great Britain and Ireland for space in the industrial classes amounts to about 8,200, and the total space demanded to over a million square feet. As the latter quantity, to suit the necessities of the building, must be reduced to less than one-fifth of its present amount, it is evident that the number of exhibitors will be very far short of that of the applicants. The delicate task of reducing these demands within proper bounds has been entrusted to class or local committees, and it is to be hoped that they will execute their work in such a way as to secure a proper representation of British industries. Many applications may be ruthlessly disposed of at once, as they refer to objects so entirely unsuited for exhibition as to render their rejection a matter of necessity.

It is expected that Her Majesty's Commissioners will take into consideration any appeals which may be made against the decision of committees on the subject of space, but that such appeals must be transmitted through the respective committees, and be heard at the expense of the appellants.

The French Commission has taken a house in Cromwell-road, opposite the main entrance, to be used by them as offices during the continuance of the Exhibition.

The following additional information has been received:—

TUNIS.

The Bey of Tunis has instructed his Prime Minister to provide articles for exhibition, and two commissioners will be appointed to go to London to represent the exhibitors from that country.

NEW ZEALAND.

Her Majesty's Commissioners have received information of the nomination by his Excellency Col. Browne, the Governor of New Zealand, of the following Commissioners, in the several provinces set against their names:—

AUCKLAND.—His Honour the Superintendent, Elwin

Brodie Dickson, Carl Frank Fischer, Charles Heaphy, Edward King, George Patrick Pierce, Robert Patterson, and George Webster.

TARANAKI.—His Honour the Superintendent, Harry Albert Atkinson, and Edward Larwill Humphries.

HAWKE'S BAY.—His Honour the Superintendent, Alexander Kennedy, Joseph Rhodes, John Alexander Smith, and Henry Stokes Tiffen.

WELLINGTON.—His Honour the Superintendent, Richard John Duncan, George Hunter, William Lyon, George Moore, Robert Stokes, William Spink, James Smith, and Jonas Woodward.

NELSON.—His Honour the Superintendent, Jacob Baley, James Lugsdin Bailey, Edward Baigent, Edward Everett, Charles Elliott, and Isaac Mason Hill.

MARLBOROUGH.—His Honour the Superintendent, William Henry Eyes, and William Douglas Hall Baillie.

CANTERBURY.—His Honour the Superintendent, Cyrus Daire, William Donald, Robert Greaves, George Arthur, Emilius Ross, William Wilson, and Augustus Edward White.

OTAGO.—His Honour the Superintendent, Rev. Thomas Burns, D.D., Thomas Bannatyne Gillies, John Hyde Harris, Charles Henry Kettle, William Purdie, and John Matthew.

SOUTHLAND.—His Honour the Superintendent, John Blacklock, James Alexander Robertson Menzies, Thomas John White, and John Topi Patuki, of Stewart's Island.

John Morrison, Esq., of No. 3, Adelaide-place, London-bridge, has been also named as London Commissioner for New Zealand.

THE BRITISH COLONIES AND THE INTERNATIONAL EXHIBITION.

By P. L. SIMMONDS.

No. VIII.—THE AUSTRALIAN COLONIES.

SOUTH AUSTRALIA.

If it was considered of importance that this colony should be represented at the great Exhibition of 1851; it is generally felt by the colonists that it is of infinitely greater importance that South Australia should be worthily represented in 1862. Since the last Exhibition the progress of the colony has been wonderful; its population has doubled. Instead of 70,000 acres in tillage, there are now 360,000. The pastoral wealth of the colony is treble, and its mineral wealth nearly double, what it was in 1851. There was not a single pound of wool sent to the Exhibition of 1851, but at the present time the colony exports about 10,000,000 lbs. annually; and the production has more than trebled in the ten years. The live stock in the colony in the same period has more than quadrupled, and the value of its exports trebled.

In opening the Session of the Colonial Parliament, on the 26th April, his Excellency the Governor-in-Chief, thus alluded in his speech to the International Exhibition:—

"I shall direct a communication from the Right Hon. the Secretary of State to be laid before you, calling my attention to the Exhibition for All Nations, proposed to be held next year in London; and I am to invite your cordial assistance in providing the necessary means, and promoting the measures best calculated, to enlist the sympathy, and render effective the exertions of this community, to make their contributions on that occasion worthy of the great resources of this province."

In a despatch to His Grace the Duke of Newcastle, Secretary for the Colonies, dated Adelaide, May 23rd, his Excellency Sir R. G. Macdonnell, C.B., also writes:—

"Since the first intimation reached me indirectly of an intention to hold such an Exhibition, I several times brought the matter under the notice of my ministry, being anxious that steps should be taken early to organise and centralise efforts to give effect to what I felt must be the general desire of the community. I was therefore extremely glad to receive your Grace's circular despatch on the subject, as I felt authorised thereby to allude to it in my speech on the 26th ultimo, when opening the present Session of Parliament.

"Subsequently, and on consultation with my ministry, I resolved to adopt the plan which I had followed in connection with the Indian Mutiny Relief Fund. I therefore addressed letters to the persons most likely to be useful in promoting the objects of the intended Exhibition, and invited them to meet me at my office on the 13th inst.

The meeting was very respectably attended, and I then explained my reasons for convening it. The main result was, that on my suggestion a large and influential General Committee was nominated to ensure the produce and manufactures of the Colony being worthily represented at the International Exhibition.

"That General Committee was, also at my suggestion, divided into sections, each entrusted with the duty of attending to the illustration of some leading interest of the colony, such as the pastoral, agricultural, mining, &c.

"So much at least has been accomplished, that the General Committee and various sections thereof are now formed. I am President of the General Committee, and Mr. Francis Dutton, M.P., is the Honorary Secretary, so that the Trustees can now communicate at any time with a body which I hope, to use your Grace's words, is likely to command the confidence of those who may become exhibitors.

"Another step for completing the representation of this colony has also been taken this day by myself in Executive Council, viz., the appointment in the room of Mr. Edward Stephens, lately deceased, of Mr. Alexander Laing Elder, to be the representative of the colony in London, for all purposes of the Exhibition, in conjunction with Mr. Walters, the Agent General. Mr. Elder is a gentleman for many years favourably known to the South Australians, and deservedly enjoys the general confidence and esteem of this community. I cannot, however, but express my great regret that a necessity for this appointment should have arisen, through the death of so valuable a friend to the colony as the late Mr. Edward Stephens, to whom, in recognition of his services as representative of the colony at the Statistical Congress, it had been intended to entrust the interests of South Australia in connection with the International Exhibition.

"I think there is room for congratulation as to the organised manner in which these various sections are already proceeding to work out the objects entrusted to them, and I shall be much disappointed if the wool, cereals, wines, and minerals of the colony do not rank honourably at the forthcoming Exhibition."

The finest wheat of South Australia is grown on the hills, and in order to be received in time, samples of the new wheat of the harvest of next year will be sent by an early mail by the overland route through Suez and the Mediterranean. The best samples of wheat and other grain will be sent both from the hills and plains, and samples of wool and other produce from different districts. Among the articles sent in 1851 were, wheat, barley, flour, olive oil, soap, collections of minerals, polished precious stones, a case of native gold, and a case of dried native flowers. A prize medal was awarded to the collection of wheat and flour, for South Australian wheat, and to the Burra Burra Company for specimens of copper; "honourable mention" for soap, olive oil, preserved meats, and copper ores.

I notice complaints made in the colony of the course pursued by the London agents to whom the articles were entrusted in 1851. The articles consigned to the agents were exhibited in their own names, instead of (as the Local Committee concluded they would have been) in the names of their principals. Consequently, the Local Committee were ignored in the published award lists, and secured the prize medal for the colony only after official reference through the Secretary of State. It is still a question to whom this medal belongs, and the Governor has

suggested that it should be framed, with the names of all the contributors engraved round it, and be presented to the Adelaide Institute. The Hon. S. Davenport, who was the local secretary to the South Australian Committee for 1851, states that the effect of the award to wheat and flour of the colony, highly prized as it was, failed in satisfying individual emulation and expectation, because the individual contributors were not named in the award, or the award was not to individualised wheat and flour of the seven contributors. In anticipation of other results, the Local Committee had distinctly branded the separate seven contributions. The Governor now suggests that, whatever else is done, care should be taken to attach the names of the contributors to every package, and that each should be considered as exhibited by the party so named, and not by the General Committee or the London agent. This precaution, which was overlooked on the former occasion, caused a considerable amount of dissatisfaction.

The export of wheat from South Australia is yearly increasing; in 1859 it was 70 per cent. above the average of the past five years. This increased demand for grain is, no doubt, attributable to the estimation in which South Australian wheat is held by the millers in the neighbouring colonies for mixing purposes. In each of the years 1858 and 1859 the export of wheat to Victoria alone was about 190,000 bushels, equal to about 4,200 tons of flour—the shipments of flour were 20,028 and 17,133 tons respectively. The bread-stuffs exported to New South Wales were principally in the form of wheat, the shipments in the last two years averaging about 80,000 bushels to only about 2,000 tons of flour.

The minerals shown by South Australia are likely to be interesting, forming as they do an important item in the exports of the colony. The average annual value of minerals and metals exported in the past ten years exceeds £313,000.

The list of reported mines in the colony contains the names of 15 which are at work. In the absence of any detailed information as to the quantities of ore raised in the several mines, it may be stated that the value of mineral produce exported during the past two years amounted to upwards of three millions sterling. The large extent of mineral country, and the valuable deposits of rich copper ore, &c., lately discovered, give promise of future wealth to South Australia, the magnitude of which can hardly be estimated. The general statistics show a most satisfactory development of the material resources of the colony, and illustrate the rapid progress of the agricultural, pastoral, and mining interests during the last two years.

The exports of metals and minerals during the last five years not only evidences the increased productiveness of the mines of this colony, but also that the export of manufactured copper has increased in a larger ratio than the shipment of ore in its crude state; a fact of much importance, viewed as a profitable source of employment in this branch of industry to an increasing class of the population. The increase in the average shipment of copper is thirty per cent.; of ore, only ten per cent.

The exports of lead have more than doubled, and of lead ore the shipments have increased fivefold, indicating the rapid development of this description of mineral wealth.

Vine culture is rapidly extending. The area of the vineyards on the 31st March, 1861, was 3,180 acres against 1626 acres in 1858. The number of vines in bearing in 1861, was 1,874,851 against 1,454,471 in 1859; vines not in bearing, 1,948,510 against 1,577,881 in 1859, evidencing remarkable activity in vine planting during the last two or three years. The quantity of wine made was 100,624 gallons in 1857, and 182,087 gallons in 1861. The progress of wine making does not seem to keep pace with that of vine planting, but it is probable that as South Australian Wines have now obtained a good name, greatly increased quantities will be manufactured. About 23,398 cwts. of grapes are reported as having been sold last year, but this is evidently a very defective return, as no complete account of the actual yield of grapes could be obtained. Vine growing promises to be a source of considerable profit in South Australia, and some of the sister colonies. In New South Wales there are about 1,500 acres under vineyard; in Victoria 600, and in Western Australia 363 acres.

There is every reason to hope that the wine-growing capabilities of South Australia will be well and successfully represented at the Exhibition. The special wine committee have been very active in selecting and determining upon the wines sent in, and approving those which are to be transmitted to England. This Committee would receive and adjudicate upon samples up to the end of August. Advices are already to hand of some 25 varieties approved.

WESTERN AUSTRALIA.

Passing to the colony of Western Australia, the capabilities and resources of which remained so long dormant for want of labour and capital, we find that its progress, even under many disadvantages, has been most satisfactory in all the elements which indicate substantial wealth. The colony is now in a very different position to what it was when it sought a refuge in transportation. Its agricultural and pastoral interests have been greatly enlarged, and the colonists have, in addition, those invaluable and inexhaustible resources, the copper mines and the timber forests, neither of which were productive at the former period.

In the last ten years 30,000 additional acres of land have been brought under culture. The population, which then numbered only a few thousand, has now risen to 15,000. In agricultural progress much has been done, as well as in local improvements. The live stock have greatly increased, horses nearly fourfold, cattle and sheep more than doubled, notwithstanding the increased number of mouths to be fed. The imports have risen in value from £52,000 to £137,000, and the exports from £22,000 to £93,000. What is mainly wanted here to advance Western Australian interests is greater publicity, and more frequent notice of the colony, its products and progress, wants and capabilities.

In former years this was more attended to than at present. The colony, however, should not rest apathetically content because things are better than they were, and a certain amount of government money is expended in convict maintenance. All the other Australian Colonies are using active exertions to attract the attention of intending emigrants. New South Wales and Queensland are running a race of competition for English favour. The former has just voted £55,000 for promoting voluntary and assisted emigration, and two influential commissioners are to be sent to England to agitate and lecture on the subject. Queensland has been for some time in the field with emigration funds and free grants of land, and its London agents are actively and energetically at work, while the patriotic element of voluntary subscriptions at home has also been enlisted, and large sums contributed by Miss Burdett Coutts and other well-known names, to assist out poor weavers and other distressed persons. Tasmania and Victoria are also bidding for public favour, and using all their energies to stand well with intending emigrants. And this is a proper step at the present time, when the tide has ceased to flow to the States, and there is even a reflux of English and German settlers glad to escape from the dissension and turmoil and the necessity of taking part in a struggle in which they feel no sympathy.

The large and progressive increase in the value of the exports, which have now reached nearly five times the amount of 1850, will be found principally under the heads of copper ore, timber, sandal wood, and wool.

The York Agricultural Society, without waiting the action of the Government, appointed a committee of its body, in May, for the purpose of collecting the productions of the York district and forwarding them to the Exhibition in London. The Central Committee appointed by the Governor consists of the Rev. the Dean of Perth, chairman; Messrs. Lochee, G. Shenton, Carr, and L. S. Leake

E. W. Landor, secretary. Acting by the authority of the Government, the Committee have appointed Mr. Alexander Andrews, the editor and proprietor of the *Australian Mail*, special London Commissioner for the Exhibition. The colony has had allotted to it a net space of 350 feet, and the Local Committee state that no pains will be spared to render the collection of the natural productions of Western Australia as satisfactory and complete as circumstances will admit.

The chairman of the Committee, writing in June, states:—"Mr. F. Gregory has but lately started on an exploring expedition to the northward, under the auspices of the Royal Geographical Society, and will probably, in the course of the next few months pass over a very large extent of country, the character of which has been hitherto mere matter of conjecture. The geological and botanical specimens which he is likely to bring back from this at present unknown region, would probably be to the scientific world the most interesting portion of our whole collection." The Committee hoped to complete the collection in Perth by the end of November, and would then dispatch it by first wool ship.

The Central Committee has appointed District Committees, to whom they have addressed circulars, describing their duties and suggesting the articles it would be advisable for them to collect. They have also placed themselves in communication with various parties likely to further the objects they have in view—and numerous objects intended for exhibition are coming in.

Some fine samples of copper ore have already been forwarded from the Wheel Fortune Mine.

Messrs. Yelverton and Co., assisted by Mr. Couchman, are engaged in supplying some of the finest samples of ship-timber,—Jarrah, Tooart, and Blue Gum. The Toodyay Committee are preparing to forward specimens of Shea-oak, and of various other woods in that district; also a section of a remarkably fine boss or excrescence on a Flooded-gum tree, measuring twenty-eight feet in circumference, asbestos, wool, wheat, &c. The York Committee will send samples of wheat, wool, skins of wild animals and birds, timber, fossils, clays, gums, &c. From King George's Sound some very superior specimens of Shea-oak will be sent; also a quantity of black sand, similar to the iron sand of Taranaki; and an interesting specimen of the petrified trees found in that district.

A goodly collection of ore is being made by Mr. George Shenton. Mr. L. Samson has forwarded a piece of Jarrah which has been exposed to the elements for about 30 years, and has resisted the white ant and dry rot, and is now as sound as ever. This peculiar property of the Jarrah (the only wood in all Australia possessing the quality) cannot be too often brought before the notice of the British public. A similar piece of wood, forming one of the piles of the jetty at Fremantle, and which has been 28 years in the sea, where the *teredo navalis* destroys every other wood in a few months, has been contributed by Mr. D. Scott. Some splendid planks of the Jarrah, equal in colour and grain to the finest Spanish mahogany, have been sent by Mr. King and Mr. Oriol.

Mr. Sloane has also forwarded some fine woods, for naves of wheels, spokes and fellies, &c.

Mr. W. Pearce Clifton will contribute samples of his various excellent wines; also, fine olive oil, wheat, and turned specimens of various woods.

Mr. T. Little, Mr. E. Hamersley, and other wine growers, will forward samples of colonial wine.

An elegant work-table, now being constructed for Mr. Theodore Fawcett, will be lent by him to the Committee for exhibition. A handsome work-box, the lid of which is composed of seventy-two pieces of beautiful woods, has been also obtained by the Committee.

Major Henderson, Comptroller-General, is kindly superintending the construction of a cabinet, which, we have no doubt, will excite admiration, even when compared with the woods and workmanship of Germany and France.

THE INTERNATIONAL EXHIBITION OF 1862.

APPLIANCES FOR HOUSE WARMING—COOKERY.

The subjoined has been forwarded to the Editor by Mr. Edwin Chadwick, C.B.:—

The following suggestions for testing the extent to which the objects have been attained with different classes of fire-grates, and cooking apparatus applicable to different classes of houses, have been submitted to the consideration of the Committee on Sanitary Appliances, by Dr. Sutherland, who has paid special attention to the subject, as a member of the Commission on the Construction of Barracks and Hospitals, under which, as may be seen by their Report,* analogous trials were conducted. The Committee have had under consideration arrangements with Mr. Pepper, of the Polytechnic Institution, for testing there any grates or ranges which exhibitors may choose to send, Mr. Pepper undertaking to see that the trials are conducted in the most careful and impartial manner. It has been proposed that exhibitors should be allowed to have their stoves and apparatus fed by their own men, the fuel being weighed by the officers of the Institution, and that visitors of the Polytechnic should be allowed to witness the experiments, and the exhibitors invited to control, by their presence, the testing of the grates and ranges of their competitors. The definitive arrangements are at present under consideration, and when some preliminary trials have been made they will be announced. Meanwhile the following are to be considered as suggestions to manufacturers, foreign as well as British, of points of attainment, and of the means of attaining them, of which it is desirable that they should, as far as practicable, make their own preliminary trials by their own available means.

It has been proved by experience that the amount of fuel consumed for domestic purposes is greatly in excess of what is required either for cooking or warming, while in public establishments, such as barracks, workhouses, &c., the fuel wasted amounts to a large item of the current expenditure. The amount of this waste may be estimated from the facts recently published in a War-office Report, which show that the amount of fuel per head required for cooking, in different large establishments examined, varies from 7 lbs. per diem, to 6 lbs., 4 lbs., 3 lbs., 2 lbs., 1 lb., the quantity diminishing with improved cooking ranges down to half a pound per head per diem, a quarter of a pound, and in one striking instance down to less than an ounce per head per diem. Similar differences are found to exist in domestic cooking ranges, leading to considerable pecuniary loss among all classes of society, but more particularly among the poor, who are often obliged to suffer serious privations from want of fuel during the winter, although the total amount consumed during the year may have been much more than requisite for all domestic purposes.

The waste is, no doubt, partly due to the extravagant use of fuel, but the Government inquiry alluded to has demonstrated that cooking ranges are frequently constructed on principles so erroneous as to render any economical use of fuel almost if not altogether impossible.

In the desire to afford every encouragement to the improvement of domestic cooking and warming apparatus, the attention of home manufacturers, and also of foreign committees, is called to the great importance of sending for exhibition contrivances which have been proved by sufficient experience to fulfil the objects required.

1st. It is suggested, as a basis of classification for both cooking apparatus and fire grates, the kind of fuel they are intended to consume, under the following heads:—

(*a.*) Coal, stating the kind.
(*b.*) Coke.
(*c.*) Wood, stating the kind.
(*d.*) Charcoal.

* *Vide* also the Report of the Commission on Warming and Ventilation.

I.—Cooking Apparatus.

1. It is suggested that the apparatus sent for exhibition should be divided into the following classes:—

Cooking apparatus for—

(*a.*) The cottage.
(*b.*) The house.
(*c.*) The mansion.

The contrivances of class *a* should be capable of cooking the ordinary food of the working classes, heating the cottage, and affording heat for the customary processes of baking, washing, ironing, &c.

The contrivances of class *b* should be adopted simply for kitchen purposes among the middle classes, and should be capable of cooking for from four to six or eight persons.

The contrivances of class *c* should be capable of being used for the various processes of the *cuisine* among the richer classes, such as roasting, baking, boiling, stewing, steaming, in short, preparing a dinner for 12 or more persons.

2. The cooking apparatus of each class should be capable of doing their work with a minimum quantity of fuel, and the apparatus used simply as kitchen ranges should not overheat the kitchen.

3. The following are suggested as the points to be kept in view during the preliminary trials:—

1. The time required to raise the temperature of the oven to 260° Fahr.

2. The quantity of coal required to raise it to that temperature, and to keep it at the same temperature for two hours, without raising the temperature above 260° Fahr.

3. How long it takes to raise the temperature of water to 212° Fahr. in the boiler of each class of apparatus; namely, one gallon in the cottage stove, four gallons in the house stove, eight gallons in the mansion stove. In each case the nature and quality of fuel employed should be stated.

4. The heat of the oven fire should be tested, by placing before it a board five feet square, lined with tin plate, having a small hole in the centre, through which the radiant heat of the fire passes, to fall on a bright bulb thermometer placed behind the board. This board to be placed five feet from the fire, and the temperature noted.

5. When steam is used for cooking, the test to be used should be the pressure exerted through a one-inch tube at a distance of nine feet from the fire, noting the quantity and quality of the coals used, the time required to obtain the pressure, and the amount of fuel necessary for keeping it up for two hours.

6. If there be a circulating hot-water cistern for baths, &c., the quantity and quality of the coal and the time required to raise 20 gallons of water to a temperatnre of 212° Fahr. should be noted.

7. All cooking apparatus intended for competitive trial should be, as far as practicable, submitted by their inventors or exhibitors to the preliminary trials mentioned above; the results certified.

8. Various forms of cooking utensils which may be intended for competitive trial should be submitted to such preliminary tests as their inventors consider necessary, and the results certified, together with a statement of the advantages possessed by such utensils.

II.—Improved Fire Grates.

Under this head are included all open fire-places, as contra-distinguished from closed stoves, adapted for rooms of different sizes, in different classes of houses.

1. The improvements which it is desired to call forth are:—

(*a.*) Increased heating-power in the grate with a diminished consumption of fuel.

(*b.*) The combination of ventilation, by means of moderately warmed air, with warming.

2. The loss of fuel, and consequently of heat, in the ordinary fire grate is equal to from one-half to three-fourths of the entire amount of fuel consumed. It is desirable to direct attention to this great source of economy, with the view to obtaining the maximum effect of the fuel, combined with a healthy use of it.

3. Improved radiating fire grates would fulfil the conditions up to a certain point, but these grates would require to have the means of ventilation provided also.

4. The unconsumed fuel or smoke, and the waste heat which at present passes up the chimney, are, however, the chief sources out of which the economy is to be effected.

5. All such improved grates should be submitted to the following preliminary trials:—

(*a.*) The temperature of the air outside the building and inside the room, at various points, to be ascertained by fixed thermometers, not exposed to radiation.

(*b.*) The fire to be lighted with the quantity of coal required to fill the grate; the weight to be stated.

(*c.*) The temperature of the air outside and inside the room to be registered every ten minutes from the time of lighting the fire. The inside thermometers to be placed, one near the roof, one six inches from the floor, ten feet from the fire, and shaded from radiation; other two thermometers in opposite corners. The length, breadth, and height of room to be given, also the number of windows, and their breadth and height, and whether of the ordinary thinness of glass.

(*d.*) The quantity of air in cubic feet per hour passing up the chimney to be stated, also the section of the chimney, its height, and the temperature of the air in it. The method employed for ascertaining the quantity of air to be stated.

(*e.*) The quantity and temperature, taken every ten minutes, of fresh warmed air, stated in cubic feet, passing into the room. The section of the warm air inlet and its position to be stated. The means of ascertaining the quantity of air to be given.

(*f.*) After the air in the room has arrived at its maximum temperature, the additional quantity of fuel required to keep it at that point for four hours to be given, over and above the quantity first used for lighting the fire.

(*g.*) It is suggested that contrivances for the prevention of smoke, so as to increase the heating powei of the fuel, should form part of the improvements in cooking ranges and fire grates.

(*h.*) Certified results of trials should be forwarded with fire grates proposed to be exhibited or to be retested for competition.

PRODUCTS OF ST. VINCENT.

The following is extracted from Governor Nesbitt's dispatch:—

"By the return of exports it will be seen that from this volcanic island several hundred tons of pozzolani were exported in the year 1859, principally to Bermuda, Barbados, and Demerara. I am not aware whether the composition be the same as the Italian pozzolani, but I understood that it forms, mixed with about two thirds of lime, an excellent hydraulic mortar, and as a cement for pavement or otherwise, thus mixed, is useful for all similar purposes as the Roman cement. The quantity of this earth is abundant, and is shipped in the harbour of Kingstown, St. Vincent, at the rate of eight shillings per ton.

"There are some interesting productions in the Island of St. Vincent not specified in the blue book.

"Among these conspicuously prominent, on hill, in valley, and continually meeting the traveller's eye, and as if of spontaneous luxuriant growth, are the bread fruit trees, bearing in the greatest abundance food as nutritious as the yam and potato; the productions of these trees are, I understand, a great resource for the families of the labouring classes, placing them in a much more independent position to similar classes in Barbados, Jamaica, and other West India Islands, where the bread fruit tree is not multiplied to the same bountiful extent.

"Another natural production is chalybeate water, welling tepidly from various springs in this island.

"Numerous magnificent mountain cabbage trees of gigantic proportions adorn the country. There are a variety of other tall and stately palm trees, but the cocoa nut palm trees here, as in many of the West Indian islands, have in great numbers, from some insect blight, died out, while most of living ones exhibit a moribnnd appearance.

"The bamboo cane is in luxuriant growth here, is very ornamental, and is useful for fences, and as conduits for the streams from the moumtains of this well-watered island.

"Insect life actively abounds after dark, innumerable large fire-flies emitting vivid flashes shooting incessantly through the trees in all directions. The continuous noise of varied other insects dutring the night at my residence, 'The Garden,' resembles somewhat the ticking of numbers of clocks, accompanied by the sound of an occasional castanet, all in discordant chorus, to which, however, time and custom gradually dull the ear."

OYSTER FISHERIES.

At the recent Colchester Oyster Feast, in the course of the proceedings, Mr. Papillon, M.P., read an extract to show that the grand secret of successful oyster culture lies in the fact of the seed obtaining an immediate and permanent resting-place. In order to afford points of attachment the French pisciculturists have hit upon the plan of sinking in the water a series of fascines, constructed out of branches of trees, and these, resting upon an artificial bottom composed of fragments of stone and brick and pieces of broken pottery ware, afford capital breeding ground for any quantity of oysters. As a proof of this 20,000 small oysters were found attached to a branch plucked from one of the beds. One of the official reports of the fisheries states that the total expense of forming an oyster bank was 221 fr., and if 300 fascines laid down upon it be multiplied by 20,000, the number of oysters they contain, it would be seen that 6,000,000 were obtained, which at 20 fr. per 1,000, would produce 120,000 fr. for the 221 fr. originally expended.

BRITISH ASSOCIATION 1861.

The following Paper was read before the Mechanical Section:—

ON EXPERIMENTS ON THE GAUGING OF WATER BY TRIANGULAR NOTCHES. By JAMES THOMSON, A.M., PROFESSOR OF CIVIL ENGINEERING, QUEEN'S COLLEGE, BELFAST.

In 1858 I presented to the Association an interim report on the new method which I had proposed for the gauging of flowing water by triangular (or V-shaped) notches, in vertical plates, instead of the rectangular notches, with level bottom and upright sides, in ordinary use. I there pointed out that the ordinary rectangular notches, although for many purposes suitable and convenient, are but ill-adapted for the measurement of very variable quantities of water, such as commonly occur to the engineer to be gauged in rivers and streams; because, if the rectangular notch be made wide enough to allow the water to pass through it in flood times, it must be so wide that for long periods, in moderately dry weather, the water flows so shallow over its crest, that its indications cannot be relied on. I showed that this objection would be removed by the employment of triangular notches, because, in them, when the quantity flowing is small, the flow is confined to a narrow and shallow space, admitting of accurate measurement; and as the quantity flowing increases, the width and depth of the space occupied in the notch increase both in the same ratio, and the space remains of the same form as before, though increased in magnitude. I proposed that in cases in which it might not be convenient to form a deep pool of quiet water at the upstream side of the weir-board, the bottom of the channel of approach, when the triangular notch is used, may be formed as a level floor, starting exactly from the vertex of the notch, and extending both upstream and laterally, so far as that the water entering on it at its margin may be practically considered as still water of which the height of the surface above the vortex of the notch may be measured in order to determine the quantity flowing.

I indicated theoretic considerations which led to the anticipation that in the triangular notch, both without and with the floor, the quantity of flowing would be proportional, or very nearly so, to the $\frac{5}{2}$ power of the height of the still water surface above the vertex of the notch. As the result of moderately accurate experiments which I had at that time been able to make on the flow in a right-angled notch, without floor, I gave the formula $Q = 0{\cdot}317\ H^{\frac{5}{2}}$, where Q is the quantity of water in cubic feet per minute, and H the head of water, as measured vertically, in inches, from the still water level of the pool down to the vertex of the notch. This formula I submitted at that time temporarily, as being accurate enough for use, for many ordinary practical purposes, for the measurement of water by notches similar to the one experimented on, and for quantities of water limited to nearly the same range as those in the experiments (from about two to ten cubic feet per minute), but as being subject to amendment by future experiments which might be of greater accuracy, and might extend over a wider range of quantities of water. Having been requested by the General Committee of the Association to continue my experiments on this subject, with a grant placed at my disposal for the purpose, I have, in the course of last summer and of the present summer, devoted much time to the carrying out of more extended and more accurate experiments. The results which I have now obtained are highly satisfactory. I am confident of their being very accurate. I find them to be in close accordance with the law which had been indicated by theoretical considerations; and I am satisfied that the new system of gauging, now by these experiments made completely ready for general application, will prove to be of great practical utility, and will afford, for a large class of cases, important advantages over the ordinary methods—for such cases, especially, as the very varying flows of rivers and streams.

The experiments were made in the open air, in a field adjacent to a corn mill belonging to Mr. Henry Neeson, in Carr's Glen, near Belfast.

The water supply was obtained from the course leading to the water-wheel of the mill, and means were arranged to allow of a regulated supply, variable at pleasure, being drawn from that course to flow into a pond, in one side of which the weir board with the experimental notch was inserted. The inflowing stream was so screened from the part of the pond next the guage notch, as to prevent any sensible agitation being propagated from it to the notch, or to the place where the water level was measured. For measuring the water level, a vertical slide wand of wood was used, with the bottom end cut to the form of a hook, the point of which was a small level surface of about one-eighth of an inch square. This point of the hook, by being brought up to the surface of the water from below, gave a very accurate means for determining the water level, or its rise or fall, which could be read off by an index mark near the top of the wand, sliding in contact with the edge of a scale of inches on the fixed framing which carries the wand.

By other experimenters a sharp-pointed hook, like a fishing hook, has sometimes, especially of late, been used for the same purpose, and such a hook affords very accurate indications. The result of my experience, however, leads me to incline to prefer something larger than the sharp-pointed hook, and capable of producing an effect on the water surface more easily seen than that of a sharp-pointed hook; and on the whole I would recommend a

level line like a knife edge, which might be from one-eighth to half an inch long, in preference either to a blunt point with level top, or a sharp point. The blunt point which I used was so small, however, as to suit very perfectly. If the point be too large, it holds the water up too much on its top, as the water in the pond descends, and makes too deep a pit in the surface as the water ascends and begins to flow over it. The knife edge would be free from this kind of action, and would, I conceive, serve every purpose perfectly, except when the water has a sensible velocity of flow past the hook, and in that case, perhaps, the sharp point, like that of a fishing hook, might be best.

To afford the means for keeping the water surface during an experiment exactly at a constant level, as indicated by the point of the wooden hook, a small outlet waste sluice was fitted in the weir board. The quantity of water admitted to the pond was always adjusted so as to be slightly in excess of that required to maintain the water level in the pond slightly above the height at which the hook was fixed for that experiment. Then a person lying down, so as to get a close view of the contact of the water surface with the point of the hook, worked this little waste or regulating sluice, so as to maintain the water level constantly coincident with the point of the hook.

The water issuing from the experimental notch was caught in a long trough, which conveyed it forward with slight declivity, so as to be about seven or eight feet above the ground further down the hill side, where two large measuring barrels were placed side by side at about six feet distance apart from centre to centre. Across and underneath the end of the long trough just mentioned, a tilting trough 6 ft. long was placed, and it was connected at its middle with the end of the long trough by a leather flexible joint, in such a way that it would receive the whole of the water without loss, and convey it at pleasure to either of the barrels, according as it was tilted to one side or the other.

Each barrel had a valve in the bottom, covering an aperture six inches square, and the valve could be opened at pleasure, and was capable of emptying the barrel very speedily. The capacity of the two barrels jointly was about 130 gallons, and their content up to marks fixed near the top for the purpose of the experiments was accurately ascertained by gaugings repeated several times with two or four-gallon measures with narrow necks.

By tilting the small trough so as to deliver the water alternately into the one barrel and the other, and emptying each barrel by its valve while the other was filling, the process of measuring the flowing water could be accurately carried on for as long time as might be desired. With this apparatus, quantities of water up to about 38 cubic feet per minute could be measured with very satisfactory accuracy.

The experiments of which I have now to report the results were made on two widths of notches in vertical plane surfaces. The notches were accurately formed in thin sheet iron, and were fixed so as to present next the water in the pond a plane surface, continuous with that of the weir board.

The one notch was right-angled, with its sides sloping at 45° with the horizon, so that its horizontal width was twice its depth. The other notch had its sides each sloping two horizontal to one vertical, so that its horizontal width was four times its depth.

In each case experiments were made both on the simple notch without a floor, and on the same notch with a level floor starting from its vertex, and extending for a considerable distance both up stream and laterally. The floor extended about two feet on each side of the centre of the notch, and about $2\frac{1}{2}$ feet in the direction up stream, and this size was sufficient to allow the water to enter on it with only a very slow motion, so slow as to be quite unimportant. The height of the water surface above the vertex of the notch was measured by the sliding hook at a place outside the floor, where the water of the pond was deep and still.

The principal results of the experiments on the flow of the water in the right-angled notch without floor are briefly given in the annexed table, the quantity of water

H.	Q.	C.
7	39·69	·3061
6	26·87	·3048
5	17·07	.3053
4	9.819	·3068
3	4·780	·3067
2	1·748	·3088

given in column 2 for each height of 2, 3, 4, 5, 6, and 7 inches being the average obtained from numerous experiments comprised in two series, one made in 1860, and the other made in 1861, as a check on the former set, and with a view to the attainment of greater certainty on one or two points of slight doubt. The second set was quite independent of the first, the various instruments and gaugings being made entirely anew. The two sets agreed very closely, and I present an average of the two sets in the table as being probably a little more nearly true than either of them separately. The third column contains the values of the co-efficient C, calculated for the formula $Q = C\,H^{\frac{5}{2}}$, from the several heights and corresponding quantities of water given in the first and second columns, H being the height, as measured vertically in inches from the vertex of the notch up to the still water surface of the pond; and Q being the corresponding quantity of water in cubic feet per minute, as ascertained by the experiments. It will be observed from this table that, while the quantity of water varies so greatly as from $1\frac{3}{4}$ cubic feet per minute to 39, the co-efficient C remains almost absolutely constant, and thus the theoretic anticipation that the quantity should be proportional, or very nearly so, to the $\frac{5}{2}$ power of the depth, is fully confirmed by experiment. The mean of these six values of C is ·3064; but, being inclined to give rather more weight in the determination of the co-efficient as to its amount, to some of the experiments made this year than to those of last year, I adopt ·305 as the co-efficient, so that the formula for the right-angled notch without floor will be $Q = \cdot305\,H^{\frac{5}{2}}$. My experiments on the right-angled notch with the level floor fitted as already described, comprised the flow of water for depths of 2, 3, 4, 5, and 6 inches. They indicate no variation in the value of C for different depths of water, but what may be attributed to the slight errors of observation. The mean value which they show for C is ·308, and as this differs so little from that in the formula for the same notch without the floor, and as the difference is within the limits of the errors of observation, I would say that the experiments prove that, with the right angled notch, the introduction of the floor produces scarcely any increase or diminution on the quantity flowing for any given depth, but do not show what the amount of any such small increase or diminution may be, and I would give the formula $Q = \cdot305\,H^{\frac{5}{2}}$ as sufficiently accurate for use in both cases. The experiments, in both cases, were made with care, and are without doubt of very satisfactory accuracy, but those for the notch without the floor are, I consider, slightly the more accurate of the two sets.

The experiments with the notch with edges sloping two horizontal to one vertical, showed an altered feature in the flow of the issuing vein as compared with the flow of the vein issuing from the right-angled notch. The edges of the vein on issuing from the notch with slopes two to one, had a great tendency to cling to the outside of the iron notch and weir board, while the portions of the vein issuing at the deeper parts of the notch would shoot out and fall clear of the weir board. Thus, the vein of water assumed the appearance of a transparent bell, like as of glass, or rather of the half of a bell closed in on one side by the weir board and enclosing air. Some of this air was usually carried away in bubbles by the stream at bottom, and the remainder continued shut up by the bell of water, and existing under slightly less than atmospheric pressure.

The diminution of pressure of the enclosed air was

manifested by the sides of the bell being drawn in towards one another, and sometimes even drawn together, so as to collapse with one another at their edges which clung to the outside of the weir board.

On the full atmospheric pressure being admitted, by the insertion of a knife into the bell of falling water, the collapsed sides would immediately spring out again. The vein of water did not always form itself into the bell, and when the bell was formed the tendency to the withdrawal of air in bubbles was not constant, but was subject to various casual influences. Now it evidently could not be supposed that the formation of the bell and the diminution of the pressure of the confined air could occur as described, without producing some irregular influence on the quantity flowing through the notch for any particular depth of flow, and this circumstance must detract more or less from the value of the wider notches as means for gauging water in comparison with the right-angled notch with angles at 45° with the horizon. I therefore made numerous experiments to determine what might be the amount of the ordinary, or of the greatest effect, due to the diminution of pressure of the air within the bell. I usually failed to meet with any perceptible alteration in the quantity flowing due to this cause, but sometimes the quantity seemed to be increased by some fraction, such as one, or perhaps two, per cent. On the whole, then, I do not think that this circumstance need prevent the use, for many practical purposes, of notches of any desired width for a given depth.

My experiments give as the formula for the notch, with slopes of two horizontal to one vertical, and without the floor:—

$$Q = 0{\cdot}636\ H^{\frac{5}{2}},$$

and for the same notch, with the horizontal floor at the level of its vertex:—

$$Q = 0{\cdot}628\ H^{\frac{5}{2}}.$$

In all the experiments from which these formulas are derived, the bell of falling water was kept open by the insertion of a knife or strip of iron, so as to admit the atmospheric pressure to the interior. The quantity flowing at various depths was not far from being proportional to the $\frac{5}{2}$ power of the depth, but it appeared that the co-efficient in the formula increased slightly for very small depths, such as one or two inches. For instance, in the notch with slopes 2 to 1 without the floor, the co-efficient for the depth of two inches came out experimentally 0·649, instead of 0·636, which appeared to be very correctly its amount for four inches depth. It is possible that the deviation from proportionality to the $\frac{5}{2}$ power of the depth, which in this notch has appeared to be greater than in the right-angled notch, may be partly due to small errors in the experiments on this notch, and partly to the clinging of the falling vein of water to the outside of the notch, which would evidently produce a much greater proportionate effect on the very small flows than on great flows. The special purpose for which the wide notches have been proposed, is to serve for the measurement of wide rivers or streams, in cases in which it would be inconvenient or impracticable to dam them up deep enough to effect their flow through a right-angled notch. In such cases I would now further propose that, instead of a single wide notch, two, three, or more, right-angled notches might be formed side by side in the same weir board, with their vertices at the same level. In cases in which this method may be selected, the persons using it, or making comparisons of guagings obtained by it, will have the satisfaction of being concerned with only a single standard form of guage notch throughout the investigation in which they may be engaged.

By comparison of the formulas given above for the flows through the two notches experimented on, of which one is twice as wide for a given depth as the other, it will be seen that in the formula for the wider notch the co-efficient ·636 is rather more than double the co-efficient ·305 in the other. This indicates that as the width of a notch considered as variable increases from that of a right-angled notch upwards, the quantity of water flowing increases somewhat more rapidly than the width of a notch for a given depth. Now, it is to be observed that the contraction of the stream issuing from an orifice open above in a vertical plate is of two distinct kinds at different parts round the surface of the vein. One of these kinds is the contraction at the places where the water shoots off from the edges of the plate. The curved surface of the fluid leaving the plate is necessarily tangential with the surface of the plate along which the water has been flowing, as an infinite force would be required to divert any moving particle suddenly out of its previous course.* The other kind of contraction in orifices open above consists in the sinking of the upper surface, which begins gradually within the pond or reservoir, and continues after the water has passed the orifice. These two contractions come into play in very different degrees, according as the notch (whether triangular, rectangular, or with curved edges) is made deep and narrow, or wide and shallow. From considerations of the kind here briefly touched upon, I would not be disposed to expect theoretically that the co-efficient C for the formula for V-shaped notches should be at all truly proportional to the horizontal width of the orifice for a given depth; and the experimental results last referred to are in accordance with this supposition. I would, however, think that from the experimental determination now arrived at, of the co-efficient for a notch so wide as four times its depth, we might very safely, or without danger of falling into important error, pass on to notches wider in any degree, by simply increasing the co-efficient in the same ratio as the width of the notch for a given depth is increased.

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS.

(*Continued from page 795.*)

THE COMMERCIAL MARINE OF FINLAND.—The commercial marine of Finland affords employment and the means of livelihood to the greater portion of the population along the coast, and a safe and lucrative investment to the merchant. Previous to the war, the merchantmen of Finland were engaged in the carrying trade in nearly every part of the globe, and occupied a conspicuous rôle amongst the maritime nations; but, what with the forced sales before the commencement of hostilities in 1854, the subsequent captures, and those destroyed by our cruisers, their merchant fleet was reduced to less than half its original number. The earliest authentic returns I have been able to procure relative to the commercial marine of Finland, is for the year 1826, when the fleet consisted of 250 vessels of 34,132 tons burden, and afforded employment to 2,306 hands. Ten years subsequently, or in 1836, the number of vessels had increased to 380, of 62,492 tons, with 3,580 hands, showing an addition of 130 vessels of 28,360 tons during the short period of ten years. In 1846, the number had reached 502 vessels, with a burden of 89,586 tons, and employing 5,490 seamen, showing the same rapid progress, 122 vessels of 27,094 tons, having been added to the merchant fleet of the country. At the close of the year 1852, when the commercial marine of Finland may be said to have reached its climax, and before any of the political troubles which subsequently ensued had disturbed the horizon, or induced Finnish shipowners to dispose of their vessels, the fleet numbered 507 vessels, of a collective tonnage of 108,760 tons, and afforded employment to 5,760 hands, showing an increase of 257 vessels and 74,628 tons, or double the number of vessels and tonnage since the year 1826. But this flourishing

* This condition appears not to have been generally noticed by experimenters and writers on hydrodynamics. Even MM. Poncelet and Lesbros, in their delineations of the forms of veins of water issuing from orifices in these plates, after elaborate measurements of those forms, represent the surface of the fluid as making a sharp angle with the plate in leaving its edge.

state of things was suddenly subjected to a cruel change, as, during 1853 and 1854, 158 vessels, of 51,698 tons, were sold and disposed of abroad, and 89 vessels (19,088 tons) were captured or destroyed by the allied fleets, leaving, after deducting losses by shipwreck, 295 vessels, of 43,736 tons, as forming the sum total of the Finland merchant service on the 1st of January 1856. But, in addition to the actual merchant fleet, there exists in Finland a large number of coasting vessels, not adapted for long voyages, which are owned and navigated by the peasantry or inhabitants of the coast or inland lakes. This separate class of vessels numbered, in 1850, as many as 927 craft of 49,300 tons, and afforded employment to upwards of 3,500 hands. These vessels are all very unwieldly, shaped after the fashion of a Dutch lugger; the largest carry three masts and load about 140 tons, others are only ten to twelve tons burden. They are chiefly employed in the transport of deals, planks, and battens, from the saw-mills on the shores of Saima and other lakes to the seaports, for re-shipment abroad, and also in bringing marble, granite, and iron from the quarries and mines near Sordavala and Pitkäranda to St. Petersburg, taking generally, as a return cargo, meal, flour, and colonial produce for the supply of their home districts. Upwards of 300 tons of bark are annually brought down from the Ladoga Lake in these vessels for the use of the tanneries at St. Petersburg. Helsingfors, and other towns along the coast, are supplied with quantities of firewood, fish, and farm produce from the surrounding districts, by means of these small craft. During the season the trade carried on by them between either shore of the Gulf of Bothnia is very considerable, the inhabitants of North-western Finland being, to a great extent, dependent on Sweden for the disposal of their agricultural produce and the sale of the not unimportant article—fish, of which the salmon and strömming are caught in very large quantities, and which are generally bartered away for colonial produce, tobacco, and salt. To prove the importance of the trade with Sweden in these coasting vessels, I find that, in 1852, as many as 231 Finnish vessels, together of 18,262 tons, entered inwards with cargoes in Swedish ports, the value of the imports being 691,000 rix banco, equivalent to £57,626; whilst 314 Finnish vessels cleared outwards with cargoes of a burden of 43,918 tons, the estimated value of the exports were noted at 651,000 rix banco, equal to £54,250. There are a great number of important shipbuilding establishments along the coast; in fact, every port of any importance is possessed of one; and in 1857 every yard was occupied in the construction of sea-going ships, in order to replace the large number captured or disposed of during the late war; and I am under the impression that another ten years will see the commercial marine of Finland occuping the same important rank it formerly held. Finnish vessels are all exclusively built of fir, and generally iron fastened; and on an average costs, fully rigged, 65 to 70 rubles, equal to £11 to £12 per ton. The importation of vessels, excepting such as are built of oak, is prohibited; such as are of oak pay a duty of $16\frac{2}{3}$ per cent. of their value.

FANNING'S ISLAND (SANDWICH ISLANDS. — Fanning's Island, besides large quantities of cocoanuts, produces bananas, arrow-root, and abundance of firewood. It is about ten miles in length, and of an oblong shape, having in its centre a deep lagoon, capable of holding the whole of the British navy, and abounding with a variety of very fine fish. This lagoon communicates with the sea by a channel that has $4\frac{1}{2}$ fathoms of water, and is a quarter of a mile wide, with a rapid ebb and flow of the tide. On the seaward side of the island, four miles from the entrance into the lagoon, and one mile from the shore, there is pretty good anchorage in ten fathoms water, for about thirty vessels. A convenient wharf has been erected inside the lagoon, so that a vessel of even 1,000 can easily be hove down; and the British barque *Sutton*, of 260 tons, was hove down and repaired there in 1852. It appears, likewise, that the highest hillock or point, on Fanning's Island, is not more than about twenty feet above the level of the sea; notwithstanding which, abundance of good fresh water can be obtained by digging one or two feet into the light sandy soil; and the trees, which afford good hard firewood, are many of them of rather a large size, although not lofty.

BESSARABIAN MOLDAVIA.—The territory recently annexed to Moldavia, differs in no respect from that of the province to which it now belongs. The land is equally fertile and capable of producing a very large amount of grain and other articles of commerce. It is, however, but thinly populated, as many of the inhabitants retired with the Russians. Those remaining are chiefly Bulgarians and Moldavians. Agriculture is even in a more primitive state than in Moldavia, as scarcely any European implements or machines have as yet been introduced. The only means of transport from the interior is by carts drawn by oxen or horses. There are several lakes which extend nearly to the frontier, and which might, with a trifling outlay, be rendered navigable for lighters of several hundred tons burden, and as they all have a communication with the Danube, might be made an easy and economical means of bringing produce to the shipping ports. Nearer to the sea are several salt lakes, which are a source of considerable revenue, as they produce a sufficient quantity of salt, not only for the wants of the inhabitants of the district, but for those of the whole of Bessarabia and part of Lower Russia. The question of free transit for Russian produce passing through the Moldavian territory for exportation has at last been settled, and such produce is now to be subjected to no duty beyond the payment of one piastre per kilo, which will be expended on the improvement of the streets and the embellishment of the town of Ismail. The chief towns in the interior are Bolgrad, Cahul, and Leova; and on the banks of the Danube, Ismail, Reni, Kilia, and Vilcof. The two principal ports from whence shipments are made by sea-going vessels are Ismail and Reni; the grain produced in the neighbourhood of Kilia and Vilcof being almost entirely sent in small river craft to Ismail. The port of Ismail is well adapted for all purposes of shipping, having a long extent of open natural quay, with deep water, where upwards of 100 vessels could commodiously load at one time. The chief articles of export are grain and oleaginous seeds; wool, tallow, hides, cheese, butter, oxen, and sheep. The position of the port of Ismail is unfavourable to its becoming a place of great commercial importance, as vessels loading here have to return for a distance of about fourteen miles against a strong current, in order to get into the navigable channel of the river. The deepening of the Kilia mouth would be the only means of insuring the prosperity, not only of this town, but also the whole of the new territory, and hopes are entertained that the Moldavian Government will take the necessary steps to effect this very desirable object.

GUANO.—The Island of Navassa, Windward Islands, is about $2\frac{1}{2}$ miles long from its north-west point to its south-east, and about 2 miles wide at its east end, which is the broadest part of the island. It is surrounded by cliffs of from fifteen to twenty feet high, except the western portion of the north side (where there is indifferent landing in calm weather on the rocks, which are only a few feet high), and, one spot on the south west side, where there is a sloping place which is now occupied by an American company, who are loading guano, which is plentiful on the level ground. From the top of the cliffs the land rises at an angle of nearly 45° to the height of about 300 feet; from thence the top of the island is level; and, although there is no soil on the surface where guano occurs, yet it is covered with brushwood and small trees, which spring up between the stones. They are, for the most part, cabbage palms (which grow to the height of from twelve to fifteen feet), the palmetta—a species of sea grape, and one or two other shrubs—of which we do not know the names. The north-west part of the island, where most of the guano lies, appears to be composed of

limestone, and the remainder of scoriæ. The south-west side is the resort of great numbers of boobies and other sea fowl, who build their nest on the rocks and in the low trees which grow on the rising ground above the cliffs. The Americans number about fifty people on the island, and load their vessels with guano by means of a wire rope, down which they lower the bags from the top of the hills to the landing place, from which it is taken off by boats in bad whether, but in moderate weather the vessels come alongside the loading stage. They have already exported from the island about 1,000 tons, and have stored up, ready for shipping, about 3,000 tons. The part of the island explored cannot contain less than 1,000,000 tons; but there is no doubt more on the north-east part, which was not visited. There is a very fair anchorage on the lee side, abreast the loading stage, in full sixteen fathoms (sand), within half-a-mile from the shore; the vessels waiting to load anchor within a cable's length, in about twelve fathoms—but the ground is rocky and foul, and they have already lost two anchors there.

Home Correspondence.

STRUCTURE OF METALS.

Sir,—Resuming the subject of the structure of metals, contained in my letter of the 18th inst., and especially of copper, to which I would particularly refer at present, it appears to me probable that the cells in metals are vacuums, or, at least, are not filled with atmospheric air, for this reason—when a piece of metallic copper is newly broken from the mass, the inner surfaces of its cells reflect light most brilliantly, but, when exposed to the air, they quickly oxidise and lose their brilliancy; the same effect is also seen on silver to some extent, but the oxidising effect of the air not being so great on silver as on copper, the cells of the former retain their lustre longer.

It is worthy of remark that silver and copper, which show the greatest perfection of the cell system, are those which are known to be the best conductors of heat and electricity; this fact seems to indicate that these forces may travel through the cells, the extremely sensitive and brilliant surfaces of which, with the large area afforded in the aggregate by the myriads of cells which exist even in a wire, would apparently greatly facilitate. The custom of polishing metals to prevent the radiation of heat appears to confirm this view of it, for polishing metals seems to me to be only a closing of such of the cells as may have been opened by tarnish, a partial oxidation of the surface which has taken place, or by other accidental causes.

Observations on a large number of specimens have caused me to form the following opinion on copper:—That the best "select copper," which is the most ductile and malleable, owes its superiority in these qualities to the perfection of its cell system, or in other words, to its freedom from an intermixture of the red oxide of copper, the principal difference between different samples of copper being the quantity of the red oxide that may be intermixed with the metallic mass. This intermixture is exceedingly interesting and beautiful; the form of metallic copper being naturally cellular, the form of the red oxide of copper is globular, so that in an impure sample of copper the minute globules of the red oxide are seen interspersed with the cells of the metallic, the former being of a beautiful ruby colour, presenting a rich variety of colour with the metallic, but this variety of constituent sadly deranges the structure and lines of fracture of the mass, and leads me to believe that the process of toughening the metal, by what is called "poling" during the refining, is principally, if not entirely, a mechanical one; for, by the ebullition caused by the plunging of the pole into the mass of fluid metal, the red oxide is liberated, and from its less specific gravity it instantly rises to the surface.

I am, &c., W. VIVIAN.

Pary's Mines, Bangor, North Wales, October 28th, 1861.

Proceedings of Institutions.

Bradford Mechanics' Institute. — The twenty-ninth annual report records a decrease during the year in the number of subscribers, a circumstance to be accounted for by the very depressed state of trade during last winter. The following is a classified list of the members and subscribers during the last two years:—

	March 31, 1861.	March 31, 1860.
Life members	126	126
Members at 12s. per annum	477	486
Subscribers at 10s. "	168	182
Ditto, 8s. "	348	394
Female subscribers at 6s. per ann.	47	52
Firms	9	13
Persons nominated by firms	73	94
	1,248	1,347

The subscriptions for the year amount to £512 12s. 10d., and the receipts from other sources to £185 18s., being a total decrease of £26 as compared with last year's receipts. The total expenditure has been £703 4s. 2d., reducing the balance in hand from £48 14s. 5d. to £44 1s. 1d. Notwithstanding this reduction in the total receipts, it has not been found necessary to reduce the expenditure in the various departments of the Institute's operations. In the library the expenditure has been increased by about £10, principally in the re-binding of books; and the amount paid for teacher's salaries has been again increased by more than £20. The increase in the library during the year has been 308 volumes, raising the total to 7,758. There have also been purchased 52 volumes to supply the places of worn-out books. There has been an increase in the number of volumes circulated, though the library has been open four days less than in the preceding year. In 1859-60 the issues were 35,498; last year they reached 36,368, being an advance on the year of 870, and on the daily average of 4·56. The interest in the news and reading rooms continues without abatement. There is a good attendance—both the rooms being well frequented, especially in the evening, when they are often crowded, affording conclusive evidence that more space is wanted to make this part of the operations of the Institute both more complete and self-sustaining. The lectures have been of an unusually varied character, comprising subjects in literature, biography, and science—the latter class bearing a larger proportion than usual; and although the Committee cannot yet speak of them as being positively popular, they are glad to find them every season increasing in favour with the more intelligent of the subscribers. The following is a list of the lectures, distinguishing by an asterisk those which were gratuitous:—1860.—*Rev. Dr. Burnet, Vicar, "The Importance of Character." *Rev. S. G. Green, B.A., "The Almanac; or, Days, Weeks, Months, and Years." Mons. Louis Blanc, "The Mysterious Personages and Agencies in France towards the end of the 18th Century." George Grossmith, Esq., "Sketches by Boz." George Dawson, Esq., M.A., "John Calvin." E. Lankester, Esq., M.D., F.R.S., "Animals used by Man as Food." *Mr. S. H. Kerr, Ph.D., "The Earth's Tenants, and their Traces." 1861.—*Rev. R. J. Campbell, M.A., "Eliot's Prison: one of the Spring-heads of English Liberty." *Rev. Canon Fawcett, M.A., "Geology: The Coal Formation." George Dawson, Esq., M.A., William Cobbett," George Grossmith, Esq., "The Ludicrous in Life." L. H. Grindon, Esq., "The Analogies of Plants and Animals." *Rev. J. P. Chown, "Six Days in Rome." The operations of the class department during the past session have been very encouraging, and the results bear favourable comparison with those of any previous period. Owing to the difficulty pf procuring gratuitous teachers, it was found necessary still further to increase the number of professional teachers; and, with the exception of the Physical Geography Class, which was obliged to be given up for

the want of pupils, all the advanced classes formed last year have been continued. The attendance at these classes, however, has scarcely reached the expectations o the Committee. In the Writing and Arithmetic Class the attendance continues extraordinarily large, and call for more convenient and comfortable accommodation. A novelty, in the nature of a Class for Mutual Improvement in Natural Philosophy, has been attempted during the session, and its success has been such as to lead to a hope of its continuance. Papers have been read by its members in turn upon different subjects, generally illustrated by interesting experiments. The number of members attending the French Class has been very large, and contrasts singularly with the small number constituting the German Class. The Drawing Class has sustained a diminution in its numbers; this the Committee trust is but temporary, and that the class will in future meet with the success which the eminence of the drawing-masters merits. The following table shows the classes which have been in operation throughout the session, the number of pupils on the books, and the average attendance in each class:—

Name of Class.	No. on Books.	Average Attendance.	Paid or gratuitous.
Writing and Arithmetic	260	136	Paid
Reading—two Classes	82	64	,,
Do. and Elocution	18	12	Grat.
Grammar, Elementary	77	30	Paid
Grammar, Advanced Class ...	40	17	,,
English Language & Literature	10	7	,,
Geography	30	14	Grat.
English History	18	12	,,
Mathematics	18	10	Paid
Book-keeping	19	15	,,
Chemistry	16	13	Grat.
Natural Philosophy	11	8	
French	30	25	Paid
German	6	6	,,
Drawing and Modelling.........	33	24	,,
	668	393	

The prize of £8 offered by the Society of Arts to the Local Board whose candidates obtaining certificates bear the largest proportion to the whole number of candidates, was awarded to the Local Board of this Institution last year; and it was the only one in Yorkshire which succeeded in obtaining a prize. The Local Board decided to divide five guineas of this prize among all the candidates (except two who received other prizes) in the proportion of seven shillings and sixpence to each first-class certificate, five shillings to each second-class certificate, and two shillings and sixpence to each third-class certificate. The Committee have much pleasure in recording for the second time the generosity of Alfred Harris, jun., Esq., who has shown his interest in the Institute and in these Examinations by placing £5 at the disposal of the Local Board, to be awarded as prizes to the candidates who obtained highest honours. The prizes were awarded as follows:—First prize of £3 to John G. Greenhough; second prize of £2 to Joseph S. Roberts. In conclusion, the Committee feel that they are warranted by the foregoing reports in inferring that the Institute is at present in a sound and healthy condition, and is steadily accomplishing the great object for which it was designed—the diffusion of useful knowledge amongst their fellow-townsmen. At the same time they are fully aware that, so long as its operations are confined within its present narrow limits, it cannot very greatly extend its labours, or increase its usefulness. And they therefore earnestly hope that, with a revival of trade and returning prosperity, their successors will take up the project of a new building with increased energy, and carry it forward to a successful issue.

POTTERIES MECHANICS' INSTITUTE, HANLEY, STAFFORDSHIRE POTTERIES.—The formal opening of a large and elegant building, recently erected for the purposes of this Institution, was celebrated by a public *soirée*, on Tuesday, 15th October. The chair was occupied by WILLIAM BROWNFIELD, Esq., one of the Vice-Presidents, and addresses were delivered by the Right Hon. C. B. Adderley, M.P.; the Rev. Sir Lovelace T. Stamer, Bart.; Smith Child, Esq. (late M.P. for North Staffordshire); James Bateman, Esq., R.R.S.; J. A. Hammesley, Esq., F.S.A., and other gentlemen. Besides a residence for a curator, the building contains fourteen rooms, comprising a lecture and music hall (capable of accommodating 800 persons), a large reading-room, a spacious library, class, committee, and other rooms. A report, presented by the Building Committee, stated the cost of the structure and fittings to be about £5,000, and the present deficiency about £1,100. One of the principal features is the extensive reading-room, calculated to seat about 120 persons, to erect and furnish which Mr. Brownfield (the chairman of the meeting) contributed £650. This room is supplied with 38 copies of daily, and 30 of weekly newspapers, besides 30 reviews and magazines, the subscription being one shilling per quarter.

To Correspondents.

ERRATUM.—In the last number of the *Journal*, page 791, first column, line 19, for "(who was Secretary to the Royal Society)" read, "(who became subsequently a Member and Foreign Secretary of the Royal Society)."

MEETINGS FOR THE ENSUING WEEK.

MON. ...Medical, 8½. General Meeting, and Paper by Mr. Thomas Bryant, "Remarks on Vesico-Vaginal Fistula and Ruptured Perineum, with the introduction of improved means for operating."

WED. ...Geological, 8. 1. M. Marcel de Serres, "Note on the Bone Caves of Lunel Viel, Herault." 2. Dr. A. Gesner, "On the Petroleum Springs of North America." 3. Mr. J. G. M. Seitch, "On a Volcanic Phenomenon in Manilla." 4. Dr. J. W. Dawson, F.G.S., "On some Additional Remains of Land Animals in the Coal Measures of Nova Scotia."
Pharmaceutical, 8.

THURS...Chemical, 8. 1. Mr. A. V. Harcourt, "On the Action of certain Gases on the Alkaline Peroxides." 2. Messrs. Abel and Field, "On some Results of the Analysis of Commercial Coppers." 4. Mr. Field, "On the Occurrence of Bismuth in Copper Minerals."
Linnæan, 8. 1. Dr. Lindley, "On West African Tropical Orchids." 2. Prof. Oliver, "On the Structure of the Anther."

FRI....... Astronomical, 8.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, October* 25*th*, 1861.]

Dated 15*th July*, 1861.

1773. T. Cobley, Meerholz, Germany—An improved process for preserving and indurating timber, wood, and other vegetable matters, and for rendering the same uninflammable.

Dated 15*th August*, 1861.

2035. J. T. Hutchings, Charlton, Kent—An imp. in the construction of tennis and racket bats.

Dated 19*th August*, 1861.

2057. E. S. Cathels, Shrewsbury—Imp. in compensating gas meters.

Dated 21*st August*, 1861.

2087. A. J. Hennart, Tournay, Belgium—Imp. in smoke consuming grates.

Dated 23*rd August*, 1861.

2105. M. Blakey, Leeds—Imp. in rotary pumps.

Dated 7*th September*, 1861.

2244. G. H. Birkbeck, 34, Southampton-buildings, Chancery-lane—Imp. in the construction of saddles. (A com.)

Dated 13*th September*, 1861.

2275. P. Dubrule, Tourcoing, France—Imp. in apparatus for manufacturing figured or ornamental stuffs with treadle power looms.

Dated 16th September, 1861.

2309. Captain A. M. Skinner, Belfast—Imp. in propelling ships' boats and other vessels. (A com.)
2312. F. M. Ransome and E. L. Ransome, Ipswich—Imp. in treating stone, bricks, and other surfaces, and in the manufacture of filters.

Dated 19th September, 1861.

2335. J. C. Coombe and J. Wright, 42, Bridge-street, Blackfriars—Imp. in the manufacture of stones, bricks, tiles, slabs, statuary, and such like materials, and in the method of and means for cleansing and indurating the same when employed in buildings or for building purposes, and for preserving them from atmospheric and other influences.
2338. E. Clark, Chatham-street, Liverpool—Improved means or apparatus for self-acting signals in tunnels and elsewhere on railways.
2343. T. Silver, Philadelphia, U.S., and T. Moore, 33, Regent-circus, Piccadilly—Imp. in the construction of and appliances to steam ships or other vessels.
2348. T. Redwood, 19, Montague-street, Russell-square—An imp. in the manufacture of paper.

Dated 21st September, 1861.

2367. W. Tongue, Bradford—Imp. in machinery for combing, heckling, and dressing fibrous materials.

Dated 27th September, 1861.

2419. J. Waller, Anerly, Surrey—An improved smoke-consuming stove.

Dated 2nd October, 1861.

2452. D. Rérolle, 4, South-street, Finsbury—An improved steam digging machine.
2459. W. Thompson and T. Stather, Kingston-upon-Hull—Imp. in hydraulic presses.

Dated 4th October, 1861.

2478. A. David, jun., Nantua, France—Imp. in preparing and fixing street and other inscriptions or lettering on metallic plates.
2480. G. Knox, Skinner's place—An imp. in paper-making machines.
2484. J. Dellagana, Shoe-lane—Imp. in finishing and perfecting curved or circular stereotype plates, and in apparatus for the same.

Dated 5th October, 1861.

2489. E. Partridge, Smethwick, Staffordshire—Imp. in hardening iron and steel, and a composition or substance to be employed therein.
2494. Lieutenant G. Nares, R.N., Portsmouth—An improved method of effecting communication between places, otherwise inaccessible to each other, by means of kites and an apparatus connected therewith.

Dated 7th October, 1861.

2498. B. P. Walker, Wolverhampton—Imp. in rifle sights and rifle sight guards, and a new or improved rifle cleaner.
2500. W. Callcott, Park-village East, Middlesex—Improved means and apparatus for producing scenic effects.
2502. G. K. Stothert, Bristol—Imp. in condensing apparatus.
2504. F. J. Evans, Horseferry-road, Westminster—Improved apparatus for generating gas.

Dated 8th October, 1861.

2510. W. Simpson, Calais—Imp. in the manufacture of twist lace made in twist lace machines.

Dated 9th October, 1861.

2519. J. Norman, Glasgow—Imp. in hammers to be worked by steam or other elastic fluid and in anvils for the same.
2521. H. B. Coathupe, Junior United Service Club, St. James's, and F. H. Waltham, 15, Palace-street, Haverstock-hill—Imp. in obtaining or producing and applying embossed or raised and engraved or indented metal or other surfaces.
2522. F. Curtis, Newton, Middlesex—A new and useful imp. in fire-arms.
2523. W. Palmer, Sutton-street, Clerkenwell—Imp. in lamps and lamp wicks.
2524. J. J. Russell, Wednesbury—Imp. in hand stocks and dies for cutting screws.
2525. T. Tidmarsh, Dorking, Surrey—An improved artificial manure.
2526. J. Schwartz, Osborne-street, Whitechapel—An imp. in the manufacture of sugar.

Dated 10th October, 1861.

2528. T. B. Bennett, and J. Collier, Gilnow Mills, near Bolton-le-Moors—Certain imp. in or applicable to self-acting mules for spinning.
2529. D. S. Brown, Eton-lodge, Ashby-road, Islington—Certain imp. in propelling and sustaining balloons and aerial machines in the air.
2530. W. Mould and J. Hall, Belmont, near Bolton, and S. Cook and W. H. Hacking, Bury—Imp. in machinery for manufacturing healds or harness used in looms for weaving.
2532. J. Stevens, Birmingham—Certain imp. in connectors and adjusters for connecting and adjusting crinolines.
2533. L. Christoph, Paris, W. Hawksworth, Linlithgow, N.B., and G. P. Harding, Paris—Imp. in the manufacture of cast steel and other metal tubes, and in the machinery or apparatus employed therein, parts of which imp. are applicable to the manufacture of gun barrels and ordnance, and to the rifling of same.
2534. B. Browne, 52, King William-street—A new improved spring. (A com.)
2538. W. Clark, 53, Chancery-lane—Imp. in apparatus for bending iron rails or bars. (A com.)

Dated 11th October, 1861.

2541. R. Richardson, 26, Great George-street, Westminster—Imp. in the manufacture of railway fastenings, and a mode of preparing rails and fish plates to receive them.
2542. T. B. Collingwood and A. Butterworth, Rochdale—Imp. in throstle and doubling frames for spinning and doubling fibrous materials.
2543. W. E. Newton, 66, Chancery-lane—Imp. in the condensers and condensing apparatus of steam engines. (A com.)
2544. N. Stram, 12, Ashby-street, Northampton-square—Imp. in watches.

Dated 12th October, 1861.

2546. E. Corke, Southborough, Tunbridge Wells, Kent—An improved instrument to be attached to the bayonet or barrel of a rifle or other fire-arm for estimating distances.
2547. R. Edge, Dean Mills, near Bolton-le-Moors—Certain imp. in machinery for preparing, spinning, and doubling cotton and other fibrous materials.
2549. J. C. Ramsden, Bradford—Imp. in healds or headles for weaving, and in the machinery or apparatus for making the same.
2550. V. Pirson and A. De Keyser, Brussels—The application of a new material in the manufacture of paper cardboard and yarns.
2551. E. T. Hughes, 123, Chancery-lane—An improved compound to prevent the incrustation and sediments of calcareous matters in boilers. (A com).
2554. M. Cartwright, Carlisle—Imp. in stench traps.
2555. A. V. Newton, 66, Chancery-lane—Improved machinery for dressing and cleaning wheat and other grain. (A com.)

Dated 14th October, 1861.

2558. W. Macnab, Greenock—Imp. in marine steam engines and boilers.
2559. H. J. Distin, 9, Great Newport-street, Leicester-square—Imp. in metal musical wind instruments.
2560. J. Browning, Minories—Imp. in barometers.
2562. F. B. Houghton, 6, Clarendon-terrace, Kensington—Imp. in apparatus employed in reducing straw and other vegetable substances in the manufacture of pulp for making paper.
2563. M. Walker, St. Benet's place, Gracechurch-street—Imp. in breech-loading rifles.

Dated 15th October, 1861.

2564. J. Flinn, sen., Coventry—An imp. in watches.
2565. C. Wynants, Belgium—An improved chase for printing presses.
2566. W. Bland, Baildon, near Leeds—Imp. in pickers used in looms for weaving.

PATENTS SEALED.

[*From Gazette, October 25th, 1861.*]

October 24th.

1029. G. Scott.
1031. D. Barker.
1036. P. G. Gardiner.
1037. T. Garner.
1041. J. S. Templeton.
1045. S. C. Salisbury & J. Starley.
1047. C. J. Hill.
1048. R. J. Cole.
1055. J. Marshall.
1059. S. C. Salisbury & J. Starley.
1060. J. Poole and W. Milward.
1061. J. Foster, E. H. Bramley, and E. Knutton.
1064. T. W. Miller.
1066. W. H. Parsons.
1069. H. Bessemer.
1075. W. Johnson.
1078. G. Hulme.
1080. T. A. Kendal and M. D. Rogers.
1081. W. Horn.
1083. J. Sickels.
1084. R. Laing and I. Swindells.
1085. F. J. Bramwell & W. Owen.
1089. T. Hooman and J. Maliszewski.
1091. A. McNeile.
1102. L. Glatard.
1109. M. A. F. Mennons.
1115. J. A. Manning.
1120. W. Addy.
1187. A. Dunlop.
1216. A. C. Vautier.
1257. T. Dunn.
1258. T. Dunn.
1498. W. E. Newton.
1701. W. H. Ludford.
1879. J. H. Johnson.
1955. A. A. R. Damoiseau.
2080. C. A. Wheeler.
2119. M. A. F. Mennons.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, October 25th, 1861.*]

October 21st.

2363. R. Waller.

October 22nd.

2377. F. Fowke.
2387. B. Goodfellow.

[*From Gazette, October 29th, 1861.*]

October 24th.

2378. J. Robb.
2538. T. F. Cocker.

October 25th.

2411. W. Hall and A. Wells.
2412. P. Brunon.

October 26th.

2406. A. Heywood.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, October 25th, 1861.*]

October 22nd.

2266. J. Hopkinson, jun.
2275. C. Mather.

Journal of the Society of Arts.

FRIDAY, NOVEMBER 8, 1861.

NOTICE TO MEMBERS.

The One Hundred and Eighth Session of the Society will commence on Wednesday, the 20th instant, at 8 o'clock, when Sir Thomas Phillips, F.G.S., Chairman of the Council, will deliver the opening address.

The chair will be taken at Eight o'clock on the following Wednesday evenings:—

1861.	November	—	—	20	27	
,,	December	4	11	18	—	
1862.	January	—	—	15	22	29
,,	February............	5	12	19	26	
,,	March................	5	12	19	26	
,,	April	2	9	—	23	30
,,	May..................	—	7	14	21	28
,,	June	—	—	—	25*	

For the Meetings previous to Christmas the following arrangements have been made:—

November 20.—Opening Address by Sir THOMAS PHILLIPS, F.G.S., Chairman of the Council.

*** On this evening the Medals which were awarded by the Council for Papers read at the Weekly Evening Meetings during the last Session, and for articles submitted to the Society's Committees, will be distributed.

November 27.—"Comparison of the Year 1851 with the Year 1861." By BLANCHARD JERROLD.

December 4.—"On the Building for the International Exhibition of 1862." By Capt. WILLIAM C. PHILLPOTTS, R.E.

December 11.—"On Railway Management, from the Traveller's Point of View." By THOMAS BAKER, Secretary to the Royal Indian Army Sanitary Commission.

December 18.—"On the Improvements and Progress in Dyeing and Calico-Printing since 1851." By F. CRACE CALVERT, F.R.S.

Through the courtesy of Messrs. Kelk and Lucas, the members are invited to inspect the building for the International Exhibition of 1862, on Saturday, the 30th inst., after one o'clock, p.m. A card has been forwarded to each member, admitting himself and one friend.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £435,800, have been attached to the Deed.

* The Annual General Meeting: the Chair will be taken at Four o'clock. No Visitors are admitted to this Meeting.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

Now that the building is so far advanced, the progress which is being made is not so apparent as it was when less material was on the ground. Formerly a clear view might be obtained of the whole work, and any alteration or new erection was conspicuous; now it is necessary to visit every portion of the works to discover what changes have been effected.

The roof of the nave is completed throughout its entire length, with the exception of the two last ribs at each end. These will be of iron, as they form part of the support of the framework of the domes. One of them, at the east end, is fixed, and the other is being raised. All the windows of the clerestory are in their places, and glazed. The moveable scaffold having traversed the length of the nave, has been rolled back to the place where it was built, so that a view of the whole nave is obtained. The scaffolding which is intended for the erection of the iron ribs mentioned above, has been built specially for the purpose, and is, like the scaffolds beneath the transepts, stationary.

Four columns of the eastern dome have been raised as far as the point from which the ribs are to spring, and two of the windows which are to light the dome are in their places. The south-western transept has been commenced, four of the ribs of the roof being already fixed. The labourers are at work excavating the foundations of the refreshment courts, and the concrete is ready to be laid.

Turning now to the southern Picture Gallery, it will be seen that a great advance has been made since last week. The iron coping on the face fronting the Cromwell-road, and which forms, at the same time, a portion of the cornice and the gutter of the roof, has been fixed over the eastern half of the gallery, and the two towers, with their French roofs, are fast approaching completion. In the interior the carpenters have commenced the floors. On the western half of the gallery, the last principal of the roof is fixed, the angle pieces of the towers are rising above the roof, and the battens are laid on the inside.

His Excellency the Turkish Ambassador attended a meeting of Her Majesty's Commissioners last week: it is believed that, contrary to expectation, Turkey will occupy the space which was originally allotted to her. The demands from foreign countries are now beginning to come, but in most cases are so much in excess of the space at the disposal of the Commissioners, that it is necessary to refer them back again for reduction and correction.

It is proposed that machinery, photography, and education, shall form International Exhibitions, and Foreign Commissioners are requested

to state in what way they wish to divide the space allotted to them among these classes.

Her Majesty's Commissioners have decided that the south-western court, the galleries around it, and a small portion of the nave, shall be appropriated to the French exhibitors. The French have every reason to be satisfied with this liberal arrangement, and there is no doubt they will well fill the space allotted to them.

The following additional arrangements have been made:—

Austria.

The Austrian Government have appointed a Commission in London, of which Baron Rothschild, Consul-General for Austria, is President, and Dr. Schwarz, Chief Consular Agent for Austria in Paris, Chief Commissioner.

United States of America.

The President of the United States has appointed the following gentlemen Commissioners, to arrange the proper representation of that nation at the forthcoming Exhibition:—

Hon. William H. Seward, Secretary of State; Hon. Caleb B. Smith, Secretary of the Interior; Hon. Edward Everett, of Massachussetts; Professor Joseph Henry, Secretary of the Smithsonian Institution; Robert B. Minturn, Esq., of New York; John H. Klippart, Esq., of Ohio; G. Dawson Coleman, Esq., of Pennsylvania; James R. Partridge, Esq., of Maryland; B. P. Johnson, Esq., of New York; Richard Wallach, Esq., Mayor of Washington; Joseph C. G. Kennedy, Esq., Superintendent of the Census; William W. Seaton, Esq., of Washington; Eli Whitney, Esq., of Connecticut.

Ionian Islands.

Mr. H. Drummond Wolff, C.M.G., has been appointed Commissioner to represent the interests of exhibitors from the Ionian Islands at the coming Exhibition, and will proceed to London for that purpose.

Turkey.

An intimation has been received that Turkey will be represented in the International Exhibition.

THE BRITISH COLONIES AND THE INTERNATIONAL EXHIBITION.

By P. L. Simmonds.

No. IX.—The Australian Colonies.

There are but two other Australian colonies to touch upon—Queensland and New Zealand. The former is interesting, because it is a newly-established dependency, created since 1851, and therefore its first appearance in the International Exhibition will be watched with interest. As comparatively little is yet known of it in England and the Continent, I shall give a brief detail of its position and capabilities.

Queensland.

Under the general title of the Moreton Bay District, this territory formed the northern portion of the colony of New South Wales until December 1, 1859, when it was separated from it, and Sir G. F. Bowen was appointed the first Governor of the new colony. The present area of Queensland is estimated by the Surveyor-General at about 560,000 square miles, that is, nearly ten times the area of of England and Wales. But a larger area even than this is claimed, carrying the boundaries of the colony westward to Western Australia, and southward to South Australia. By far the largest portion of the territory is available for agricultural or pastoral purposes; and, as British emigration is being promoted by the colony, its resources and capabilities are examined and questioned with much interest. At the very commencement of its political existence, Queensland takes, in point of revenue, the twelfth place among the forty-eight dependencies of the British Crown—the revenue of last year having been £160,000. The population, which in 1851 was 10,296, has increased to 25,000. This is a small community to raise so large a revenue, especially if the lightness of the taxation be taken into consideration.

The external trade of the colony already exceeds £1,000,000 in value, and is rapidly increasing. The Governor in his latest despatches, points out that vast districts of the territory of the colony stand in the same relation to the cotton and sugar that the magnificent pastures of the interior stand to the wool manufacture of the mother country. Queensland possesses regions most favourably situated for both pastoral and agricultural pursuits, and for the growth of almost every description of the produce of temperate as well as tropical climates. Her extensive mineral resources, also, will doubtless be speedily developed.

In the Botanic Gardens at Brisbane, covering 27½ acres of land, plantations have been laid out, in which may be seen twenty varieties of the vine, twelve of the pine apple, eight of the banana, and two of orange. These have all been planted with the view of determining which were best adapted to the climate and general character of the soil. Several varieties of the cotton shrub have been tried, and the result of the experiment goes to prove that this valuable plant may be cultivated with ease, and that it needs only the introduction of an adequate supply of suitable labour to render its cultivation a profitable undertaking. Eight descriptions of this plant are now growing in the gardens, viz.:—Sea Island, Cluster, New Orleans, Honduras, Boy's Prolific, Dean's Upland, Petit Gulf, and Peruvian. All but the last succeeded well.

The sugar cane has been experimented upon during the past and previous seasons, and its thriving condition would seem to indicate that it might be grown with profit. The ginger plant and two species of arrowroot have been successfully cultivated. The coffee and tea plants, the various spices, camphor, tamarind, bread fruit, numerous palms, mangoes, and other fruits. Logwood, teak, the Argan and tallow trees have been introduced. The rice paper plant from Formosa, African hemp, the famous grass cloth plant, and many others of greater or less celebrity, are successfully cultivated, thanks to the care of Mr. Walter Hill, the director of the gardens.

After these preliminary details I come to notice briefly the part Queensland intends to take in the International Exhibition. Owing to her great distance from the mother country, the full particulars of her intended contributions are not yet to hand. Very early steps were, however, taken in the colony to secure a due representation of her productive resources, and an influential local commission appointed, which has been working most energetically for many months.

Sir George Bowen, the Governor, with the advice of his Executive Council, has also appointed the following gentlemen, connected with the Colony, to be the London Commissioners for representing Queensland at the Exhibition of 1862:—Matthew H. Marsh, Esq., Chairman; Alfred Denison and Arthur Hodgson, Esqs.; Mr. Henry Jordan, the Emigration Agent in England, acting as Secretary. The Local Commission are making every exertion to secure for the productions of Queensland an adequate representation in the Exhibition. The sum of £2,000 has already been voted by the Legislature towards the expenses, and it is expected that this new Colony will compete creditably and with honourable rivalry even with its older neighbour and parent, New South Wales.

New Zealand.

New Zealand made but a small display in 1851, although some of her woods, minerals, fibrous materials, manufactures

and native curiosities were exhibited. There were only about 40 contributors, of whom half-a-dozen were home exhibitors. Auckland was then the only province that sent a collection. In 1855, about 10 or 12 exhibitors took part in the Paris Exhibition, occupying about 117 superficial feet of space. In 1850, according to the Official Illustrated Catalogue, the population of the colony, in the five provinces, was 100,000, of whom 80,000 were natives.

The chief productions then were wheat, maize, live stock, flax, pine timber, copper, iron, sulphur, and coal. Since that period many new products have been developed, especially timber, bark, Kauri resin, gold, wool, &c.

The progress which New Zealand has made in the past ten years is remarkable, both in increase of population, extension of settlement, and, as a consequence, increase of productive resources. The white population has more than trebled, having advanced to 71,508. This increase is owing mainly to the unusual tide of immigration, especially to Auckland, Canterbury, and Otago. Since 1850 three new provinces, Hawke's Bay, Marlborough, and Southland, have been declared and added to the previous six. The land under cultivation in the colony, which in 1850 included only 22,058 acres, had increased to 156,940 acres in 1859, besides 264,776 acres of land fenced in. In 1850 the live stock in the colony, horses, cattle, and sheep, numbered only 192,776 head; in 1859 they had risen to 1,932,123. The total value of imports in 1850 was £240,205, and in 1859, £1,151,030; and the value of the exports, £115,416, and £551,484 respectively, of which £521,308 was New Zealand produce and manufactures.

The subject of the steps proposed to be taken by the Government to enable the products of New Zealand to be efficiently represented at the International Exhibition, was introduced in the House of Assembly on the 2nd of August, and it was stated that from the exertions of the Local Commissioners appointed throughout the colony, a much more favourable result might be expected than was arrived at in 1851.

A public meeting was held in the Exchange Hotel, Auckland, at the close of July, to consider the best means to be adopted for obtaining specimens of the productions of that province. Capt. Daldy, who occupied the chair, said he trusted proper steps would be taken to have the productions of the province fully represented at the International Exhibition of 1862. He hoped they would also be able to forward, in the collection from thence, specimens of the productions of some of the South Sea islands. He had written to gentlemen residing in those islands to send specimens to Auckland, and he had reason to hope that these productions would be of considerable interest at home.

Mr. Edward King, the secretary *pro tem*, in proposing the first resolution :—" That in the opinion of this meeting it is highly desirable that every effort should be made to obtain as large and full a collection as possible of the productions, &c., of this province, to forward for show as the Auckland contribution to the International Exhibition of 1862, and that the co-operation and assistance of every person should be invited in promoting the objects in view," said it was seldom an opportunity occurred for exhibiting articles of New Zealand produce, and especially those of the province of Auckland, in which they were most particularly interested. On this account many people were ignorant of the capabilities of the province, and capital and energy that might be employed in developing its resources were directed elsewhere. Even many residents in the province were ignorant of the great variety and usefulness of its productions; and it was the interest as well as duty of those whom he addressed to embrace the opportunity afforded them by the projected International Exhibition of 1862, to direct the attention of capitalists to this province. Some of the indigenous New Zealand woods, for instance, were exceedingly valuable for wood engraving, but this was not generally known, or they would go largely into consumption. Box-wood was becoming so scarce at home that one of the chief reasons for the late Mr. Herbert Ingram, of the *Illustrated London News*, travelling through Canada, was to ascertain whether any of the Canadian timber was sufficiently hard to be used as a substitute for box by the wood engravers. There was an abundance of wood in the province of Auckland suited for this purpose; and they saw from a late report in the *Southern Cross* how highly New Zealand wood was prized for furniture work. But it was not in timber alone that Auckland excelled; there was the native flax, and coal just brought to light, besides many other mineral and vegetable products that ought to find their way to the New Zealand court in the Great Exhibition. Mr. King then referred to the necessity for having properly classified specimens of their produce at the Exhibition, for he said that a gentleman from Auckland, who had been at the Paris Exhibition, told him that he was ashamed to see a few pieces of rough wood and flax thrown in a corner as specimens of New Zealand produce. No persons looked at them; and that was one result of leaving these things to private enterprise.

Mr. Whytlaw seconded the motion, which was agreed to.

The Chairman remarked, in reference to the observations made by Mr. King, that the iron sand of New Zealand was attracting very considerable attention at home, and would, no doubt, become a great source of wealth to the country. It might not be generally known that there was at present in Auckland a number of watches, the caps of which, and several parts of the works, were made from the Taranaki iron sand; and he learned that it was the opinion of some of the large houses in the watch-making trade, that this New Zealand metal, from its peculiar qualities, was likely to be largely used in the manufacture of watches. It was also contemplated by iron-masters to mix it with the Swedish steel, to improve the quality of the metal. This iron-sand was not confined to Taranaki; it existed largely in the province of Auckland. He mentioned this fact to show that there might be many valuable commodities lying under their feet in this new country, of the value and uses of which they were as yet quite ignorant. It was moved and carried,

" That the Committee appointed be instructed to place themselves in communication with any persons belonging to other provinces for the same purpose, in order that we may be able to co-operate with them in making arrangements for the Exhibition."

The following resolution was also carried:—"In the opinion of this meeting, it is desirable that a collection should be obtained from the South Sea islands to forward along with the Auckland contributions."

Mr. Probert remarked that if it was found the South Sea islanders were forming committees to forward specimens of their own productions, the Auckland committee ought to be instructed not to take any joint action with them. The productions of those islands should not be mixed up with those sent from Auckland.

The Chairman observed that he had written to a gentleman, a missionary in one of those islands, who had resided there for 20 years; and as he had considerable taste in those matters, he was sure he would send valuable specimens. He hoped, among other things, to have half a cwt. of Raratonga coffee to send to the Exhibition. They had had some of the Raratonga coffee in the Auckland market last year, and it was highly prized; and it was of vast importance to the commercial classes to make public the capabilities of the tropical islands in the South Seas. It was his opinion that those islands would yet be to New Zealand and the Australian continent, in the growth of coffee, what the West India islands were to Europe and the North American States.

Mr. Harrope agreed with the chairman as to the importance of embracing the South Sea islands in the collection to be forwarded from Auckland to the International Exhibition of 1862, and he was glad to find that that gentleman had already taken steps in the matter.

Mr. Lewis inquired whether any specimens of Fiji wool

would be forwarded. He had sent a sample of it home, and it was pronounced worth 10d. per lb.

The Chairman said it was unfortunate that advantage had not been taken of the visit of Commodore Seymour, in the "Pelorus," to the Fijis and New Hebrides, as no doubt he would have co-operated with the committee. The wool and cotton grown in the Fijis were excellent in quality, and samples ought if possible to be forwarded to London.

[I may observe here that the South Sea islands will not be unrepresented. Mr. Pritchard, the British Consul at the Feejees, will show the produce of those islands under special instructions from the Foreign Office. Capt. Denham, R.N., will show a collection of articles obtained by him during the survey of the South Sea islands, in her Majesty's ship "Herald," and the Sandwich Islands will forward a good collection. They were unfortunately shut out as too late in 1851. They labour under great difficulties from their distance.]

Mr. R. Todd said several of the New Zealand trees yielded excellent dye woods, and it was a matter of great consequence at home to procure good dyes. He knew one man who had been 16 years trying to discover one particular dye, and he had not yet discovered it. He thought, therefore, that the Committee ought to take steps to show the usefulness of the indigenous woods for dyeing purposes, and with that object would move:—"That this meeting, believing that several of the New Zealand indigenous woods are valuable as dye-stuffs, instruct the committee to procure the assistance of scientific men to obtain specimens and preparations for the International Exhibition."

Mr. Whytlaw agreed with Mr. Todd as to the importance of the course suggested. It was a fact that several of the New Zealand trees contained valuable dyes, but care should be taken how they were forwarded. He might mention a circumstance regarding the *hinau*, which would show what he meant. When in Liverpool 16 years ago, a ship was advertised as containing a cargo of New Zealand dye-wood. He went on board to see what it was, and he found it was *hinau*. It turned out, however, that there was not a particle of dye-stuff in the wood, and as firewood was not required in England, the cargo was thrown overboard. Knowing that *hinau* dyed a deep black, he inquired of a scientific man why it was that the wood imported to Liverpool from New Zealand lost its dyeing properties, while it was an excellent dye-stuff there. That gentleman informed him that there were certain dyes soluble only in their own sap, and that when the wood was dried they lost their colouring properties, and that *hinau* possessed that peculiarity. On his (Mr. Whytlaw's) return to Auckland, he found a ship loading with *hinau* as dye-wood for the English market, and he took advantage of his knowledge and published an article in the *Southern Cross* calling attention to the fact. The next day he was waited on by the owner of the cargo, who, on being assured of his sincerity, sold the timber as firewood, and thus saved a heavy loss on freight. But the dye-stuff could be reduced from the wood and forwarded as a preparation. It was quite right, however, that the capabilities of the colony to supply the English market with dye-stuffs should be fully known.

The Chairman said, if the wood was cut and dried with the sap in it, the colouring matter would be retained. He knew this from the fact that when he was going to England in the ship with Dr. Martin and Mr. Brown, who were writing their books on New Zealand, he (the chairman) had manufactured ink from the dry *hinau* on board, as the supply of ink had run out.

Subscriptions are to be raised for defraying any costs or expenses which may be incurred. A Committee of twenty-six gentlemen was appointed, with power to add to their number—His Excellency the Governor being Patron, and His Honour the Superintendent Vice-Patron. Previous to forwarding the articles to London, a public exhibition of them is to be held in Auckland, before November, the proceeds arising from which are to be awarded to successful exhibitors in the several classes.

The contributions from Auckland, it is expected, will have to be sent *viâ* Sydney, and the Auckland ship owners will take them thus far free. Influential persons are to be requested to collect specimens for the Exhibition, and forward them to the Auckland Committee.

Dr. Fischer proposes to have a piece of furniture, made of New Zealand woods, forwarded for exhibition, and a subscription list had been opened to carry out the design. A fund was to be raised of from £100 to £150, to pay the prime cost of the workmanship and material; the subscribers were to be repaid in full from the proceeds of the sale, after exhibition, handing over the balance of profit, if any, to the manufacturer. The workmanship is to be entrusted to Mr. A. Seufert, Wellesley-street.

"That Auckland," observes the *Southern Cross*, "(and through this metropolitan province the entire colony) should be worthily represented at the International Exhibition of all Nations, ought to be the earnest desire of every one in this community; and the proposed plan of procuring subscriptions to be refunded, for defraying the outlay on the elaborate work of art, displaying the adaptness of New Zealand woods for furniture purposes, is among the best that could be devised for that purpose. It is proposed to manufacture an escritoire of fancy inlaid work, showing every description of workable indigenous wood; the design to be left to the artistic skill and judgment of Mr. Seufert. When it is mentioned that Mr. Seufert was the foreman of Messrs. Liestler and Co., of Vienna, under whose superintendence the magnificent gothic book-case, which was shown in the Austrian Court at the Exhibition of 1851, and which was presented to her Majesty the Queen by the Emperor of Austria, was manufactured, and that the elaborate turret wings of that book-case were of his own workmanship, those who were at the Exhibition will be fully satisfied that he is quite competent to discharge the onerous duty about to devolve on him. To those who were not fortunate enough to have traversed the aisles of the Crystal Palace of 1851, and examined, among others, the elaborate work of art just mentioned, a visit should be paid to Mr. Seufert's premises, to assure themselves of his skill. We lately saw there a circular table top, of faultless workmanship, inlaid with eleven different varieties of New Zealand wood, and forming a chess-board pattern of very elegant and chaste design. This table top is one of several already manufactured by Mr. Seufert, and has been ordered by Mr. Monro, the Speaker of the House of Representatives. We are glad to find that we possess an artistic workman, competent to the task devolving upon him at this juncture."

A short discussion arose on the necessity for an annual exhibition of agricultural produce, new inventions, and improved agricultural implements. The want of funds was stated to be the reason why the Auckland Museum had not been made to embrace specimens of every New Zealand production.

With respect to the movements of the other provinces of the colony, there are few or no details yet to hand, but the next mail or two will probably bring advices indicating their action. In Canterbury I see it stated that Mr. Nettleton, of Karapoi, was preparing a case of specimens of New Zealand woods for the Exhibition.

Numerous home contributors will come in to swell the exhibition of New Zealand produce. Thus, the Dun Mountain Copper Mining Company of Nelson will show, through their secretary here, a large and fine specimen of chromate of iron and other geological rock specimens, one entirely new. Mr. S. Levin manufactured illustrations of New Zealand furniture woods; Messrs. Moseley and Sons, cutlery made from the titanic iron sand of Taranaki, New Plymouth, &c. Mr. John Morrison, the New Zealand Government agent, will act as Commissioner in London for the exhibitors.

From the notices I have given in the series of articles already published, it will be seen how energetically our

Southern Colonies have entered the lists for competing at the International Exhibition. Unlike the Exhibition of 1851 and that at Paris in 1855, every one of the seven noble colonies there intends to put in an appearance, and the productions of our Austral empire will be nobly represented to the world.

In future papers I propose showing what the other British Possessions intend doing in this matter.

MONUMENT AT LYONS TO JACQUARD.

The monument erected by the Chamber of Commerce of Lyons, in the cemetery of Oullins, near the city, over the grave of Jacquard, the inventor of the loom for weaving figured silk, has just been inaugurated, in presence of an immense concourse of people. After the religious ceremony the Mayor of Oullins, the president of the Lyons Chamber of Commerce, and several other gentlemen addressed the assembled crowd, dwelling at great length on the benefits Jacquard's invention had conferred on the city of Lyons. The monument consists of a white marble tomb, raised several steps above the level of the ground, and sculptured with a bas-relief representing the city of Lyons crowning Jacquard's bust. Over this, in golden letters, "A. Jacquard" is inscribed. The tomb is surrounded by a handsome iron railing.

LARGE ARRIVALS OF EAST INDIA COTTON IN LIVERPOOL.

During the last few days there have been some large arrivals of East India cotton in the Mersey. On Tuesday there were no fewer than five large ships posted as having arrived from Bombay, having on board 25,461 bales of cotton. The names of the respective vessels, together with the number of bales of cotton each ship brought, are:—The City of Agra, with 4,751 bales; the East, with 5,609 bales; the Otago, with 4,990 bales; the Langdale, with 3,495 bales; and the Euroclydon, with 6,616 bales. The Langdale made the voyage home in 93 days. The quantities of East India cotton now at sea, according to late advices, are 135,694 bales against 55,812 bales for the corresponding period last year.

ON THE RELATIVE POWER OF METALS AND ALLOYS TO CONDUCT HEAT.

Conductibility of Mercury and Amalgams.

By F. Crace Calvert, F.R.S., and Richard Johnson, F.C.S.

The following is the second part of a paper on the "Relative Powers of Metals, Alloys, and Amalgams to conduct Heat," communicated to the Royal Society, and published in the Philosophical Transactions:—

In the former paper* (say the authors) we described our experiments upon metals and their alloys: we now give the results obtained with mercury and amalgams. The method followed in the investigations described in this paper is the same as that detailed in our former one. When the amalgams were solid, we melted and cast them in square bars, and filed them down until they were 1 c. m. square and 6 c. m. long; but when the amalgam was fluid, we introduced it into the small iron box (see former paper, *Journal*, vol. vii., p. 677) and determined its conducting power.

Before stating the results obtained with amalgams made of pure metals in equivalent and multiple quantities, we wish to draw attention to the remarkable manner in which heat is conducted by mercury.

* See *Journal*, vol vii., pp. 677, 678.

But before entering into the details of our experiments, it is necessary that we should state that, having completed our researches some time since, we forwarded the results to the junior secretary, Professor G. G. Stokes, for presentation, when he kindly made to us the remark that mercury might be a worse conductor than we had found it to be, and that the means adopted by us were not sufficient to prevent the mass of mercury in the little iron box becoming heated through currents; and he suggested that we should tilt our apparatus, and ascertain what would be the influence of various angles on the conductibility of mercury as determined by our method. By following out this suggestion, we were led to the interesting discovery that mercury is the worst conducting metal known, when the heat is so applied as to prevent the mass becoming heated by currents.

To attain this object, we filled our little iron box with pure mercury, and having ascertained by its weight that it was quite full, we introduced one cub. cent. of it into each of the vulcanised caoutchouc vessels; we then poured 50 cub. cent. of cold water, and waited until it had arrived at the temperature of the atmosphere of the laboratory. The larger vessel was in its turn filled with 200 cub. cent. of water at 90°. The apparatus was so arranged that the large vessel, or the source of heat, was placed perpendicularly over the small one. The temperature of the large one was maintained at 90° during one quarter of an hour by a small jet of steam brought into it (for further details see the former paper), when we obtained the following results:—

	Temperature of the 75 cub. cent. at the beginning of experiment.	Temperature of 75 cub. cent. at end of 15 minutes.	Conductibility found reduced to 50 cub. cent. water.	Mean.	Silver 1,000.
	Deg.	Deg.			
Mercury vertical	14.8 12·6	16·0 13·7	1·80 1·65	1·7	54

We also tilted the apparatus and gave it gradually different angles, and the conductibility of heat by mercury gradually decreased as the angle increased, showing the following results:—

		Silver 1,000.
At a slight angle...............	13·5	423
Angle slightly increased......	7·3	229
Angle still more increased ...	6·9	216
Considerable angle	5·1	160

Lastly, the apparatus was used as in our former experiments, the little box being placed in a horizontal position, and the results agreed with those already published; for we obtained

	Mean.		Silver 1,000.
21·6 21·8 21·5	21·63	or	679

There cannot, therefore, be a doubt that the supposed good conductibility of heat by mercury arose from not taking into account that mercury being a fluid, its facility to conduct heat was owing to currents. The same may be said of water; for we have observed, as is already known, that it presents a complete barrier to the conduction of heat when the source of heat is applied at the upper part of a column of water. Thus in our experiments we have found that the temperature of the water in the lower vessel did not rise one-tenth of a degree during the quarter of an hour that the water in the upper vessel was maintained at 90° C.

The bad conductibility of heat by fluids when all currents are prevented in their mass, appears to us difficult to explain by the theories of undulation or radiation; for we cannot understand why the imponderable fluid caloric should not travel equally well between the molecules in whatever way the source of heat is applied, or why the

undulations should not be as rapid, nay, more rapid in a fluid than in a solid. All these difficulties disappear if we adopt the views of Mr. J. P. Joule, F.R.S., which are, that heat is conveyed in bodies by the vibrations of the solid molecules composing them.

The remarkably low conducting power of mercury presents another point of interest, as it establishes a further analogy between heat and electricity. The ratio of conductibility of these two agents by mercury, as compared with that of silver, shows such close relations when examined under the same volumes, that they deserve especial notice. Thus—

	Heat.	Electricity.
Silver	100·00	100·00
Mercury	5·33	2·12

On the Conductibility of Solid and Semi-solid Amalgams, or in which exists an excess of the Amalgamated Metal.

The amalgams belonging to this series were prepared with equivalent quantities of pure metals, and their conductibility for heat confirms the figure (54) which we now publish as representing the conductibility of mercury, silver being 1,000. In fact the observed conductibility of heat by these amalgams agrees perfectly with theoretical quantities, whilst there exists a great difference between them when we adopt 677 as representing the conductibility of mercury. The calculated numbers are obtained, as in the former paper, by multiplying the conducting powers of the respective metals by the weights, and dividing by the sum of the weights.

Amalgams of Tin.

Formula of amalgams, and per-centages.	Exterior temperature.	Temperature of the 50 cub. cent. of water before experiment.	Temperature of the 50 cub. cent. of water after 15 minutes, from 5 to 5 minutes.			Found.	Mean.	Calculated, mercury being 1·7.
	°	°	°	°	°			
Hg Sn_2 ... Hg 45·88 ... Sn 54·12 ...	15·0	14·5	18·0	20·8	23·1	8·6	8·65	8·11
	14·8	14·6	18·2	20·9	23·3	8·7		
Hg Sn_3 ... Hg 36·18 ... Sn 63·82 ...	15·0	15·1	18·9	21·9	24·5	9·4	9·45	9·2
	15·0	15·5	19·4	22·3	25·0	9·5		
Hg Sn_4 ... Hg 29·84 ... Sn 70·16 ...	14·0	13·1	16·9	20·1	22·8	9·7	9·65	9·95
	15·0	14·9	18·8	21·9	24·5	9·6		
Hg Sn_5 ... Hg 25·38 ... Sn 74·62 ...	16·0	14·9	19·1	22·5	25·2	10·3	10·6	10·5
	16·0	15·11	19·4	22·8	25·4	10·3		

Amalgams of Zinc.

Formula of amalgams, and per-centages.	Exterior temperature.	Temperature of the 50 cub. cent. of water before experiment.	Temperature of the 50 cub. cent. of water after 15 minutes, from 5 to 5 minutes.			Found.	Mean.	Calculated, mercury being 1·7.
		°	°	°	°			
Hg Zn_2 ... Hg 60.63 ... Zn 39·37 ...	...	16·0	19·6	22·8	25·6	9·6	9·70	8·97
		15·3	18·9	22·2	25·1	9·8		
Hg Zn_3 ... Hg 54·70 ... Zn 45·30 ...	...	16·1	19·7	23·4	26·6	10·5	10·45	10·05
		17·1	20·9	24·5	27·5	10·4		
Hg Zn_4 ... Hg 43·50 ... Zn 56·50 ...	...	14·3	18·4	22·1	25·4	11·1	11·00	12·08
		17·5	21·0	25·2	28·4	10·9		
Hg Zn_5 ... Hg 38·11 ... Zn 61·89 ...	...	17·1	22·6	27·2	31·0	13·9	13·95	13·05
		16·2	21·7	26·3	30·2	14·0		

Amalgams of Bismuth.

Formula of amalgams, and per-centages.	Exterior temperature.	Temperature of the 50 cub. cent. of water before experiment.	Temperature of the 50 cub. cent. of water after 15 minutes, from 5 to 5 minutes.			Found.	Mean.	Calculated, mercury being 1·7.
	°	°	°	°	°			
Hg Bi_2 ... Hg 31·82 ... Bi 68·18 ...	15·5	15·2	16·9	18·4	19·8	2·1	2·15	1·87
	15·5	15·3	17·1	18·5	20·0	2·2		
Hg Bi_3 ... Hg 23·86 ... Bi 76·14 ...	15·0	14·8	15·7	16·6	17·4	2·6	2·6	1·89
	15·0	14·7	15·6	16·6	17·3	2·6		
Hg Bi_4 ... Hg 19·03 ... Bi 80·97 ...	14·5	14·9	15·8	16·7	17·5	2·6	2·55	1·90
	14·8	15·0	15·8	16·6	17·5	2·5		
Hg Bi_5 ... Hg 15·82 ... Bi 84·18 ...	13·0	13·6	14·35	15·2	15·9	2·3	2·35	1·91
	13·5	13·4	14·25	15·1	15·8	2·4		

ON AMALGAMS WHICH CONTAIN AN EXCESS OF MERCURY.

These amalgams, also prepared in equivalent quantities, were all fluid, owing to the circumstance that the proportions per cent. of mercury predominated over those of tin, zinc, and bismuth. The condition of heat by these amalgams was therefore determined in the small iron box placed perpendicularly, and the source of heat applied at the upper part of the column; and this mode of operating has led us to observe the curious and interesting fact, that all this class of amalgams have the same, or nearly the same, conducting power, viz., from 1·9 to 2·3, although the proportions of tin vary in them from 10·52 to 22·98; those of zinc from 6·09 to 13·97; and those of bismuth from 17·55 to 34·73.

All the results obtained with these amalgams being within the limits of 1·9 to 2·3, we think it useless to give the details of the experiments.

CONDUCTIBILITY OF COMPOUND BARS.

In our former paper we described some experiments which we had made with bars composed of small cubes of copper soldered alternately with cubes of zinc, tin, and lead, having 1 c. m. of surface, and we showed that such compound bars conducted heat as indicated by theory. Since then we have pursued our researches, and have found that when compound bars are made of copper and bismuth, or of copper and antimony, then they conduct heat no longer in relation with the calculated numbers, as for instance:—

		Found.	Calculated.
No. 1 bar	3 cubes of copper, 1 cub. cent. / 3 cubes of antimony, 1 cub cent.	9·45	17·32
No. 2 bar	3 cubes of copper, 1 cub. cent. / 3 cubes of bismuth, 1 cub. cent.	3·40	13·25*

It will no doubt be remembered that we also experimented upon bars which, instead of being composed of cubes, were made of two longitudinal bars of copper, juxtaposed and soldered to two other longitudinal bars of either tin, zinc, or lead, and that all these bars conducted heat as if they had been entirely composed of pure copper, and had not contained half their bulk of tin, zinc, or lead. We have made, since those results were published, a great number of experiments with the hope of throwing some light on the above interesting fact, but we regret to say without success. We have, however, noticed a result which deserves to be recorded; it is, that a bar composed of two of bismuth and two of antimony, juxtaposed and soldered together, is the only one which conducts in the same ratio as indicated by theory; for example,—

		Found.	Calculated.
No. 3 bar	2 bars of bismuth / 2 bars of antimony	3·90	3·63

We have also ascertained that the fine film of solder existing between the blades exerts no influence whatever on the proportion of heat conducted by the compound bars, for we have—

No. 4 bar soldered { 2 of copper / 2 of zinc } gives 26·85.

No. 5 bar, in which gutta percha was employed to keep together the four small blades { 2 of copper / 2 of zinc } gives 26·35.

* These numbers were calculated in the same manner as in the case of alloys. It has been pointed out to us that in the case of the bars composed of different metals placed end to end, the theory of the conduction of heat leads to the following simple result:—the resistance of the whole bar, multiplied by its length, is equal to the sum of the specific resistances of the separate metals multiplied by their respective lengths, the resistance being measured by the reciprocal of the conductibility. This gives for the conductibilities of the bars Nos. 1 and 2, the reciprocal of the mean of the reciprocals of the conductibilities of the two component metals. Taking the numbers given in the former paper, copper (rolled) 26·95, antimony (mean of two) 6·485, bismuth 1·95, we thus find for bar No. 1, 10·45, for No. 2, 3·64, which do not greatly differ from the numbers given by experiment.

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS.

(*Continued from page 806.*)

SAN SALVADOR: ITS FITNESS FOR COFFEE PLANTATIONS.—In consequence of the cheapness of land and of labour, and the inducements held out by the Government for the advantageous investment of capital, several foreigners, principally Frenchmen, have purchased lands and commenced the culture of coffee. A considerable amount of money is by this means being gradually brought into circulation, and the country becoming more prosperous. The cultivation of coffee is attracting general attention from the fact of the few samples of this article remitted to Europe, in order to determine its quality, having realised the highest prices both in England and in France. This, taken into consideration together with the fast increasing consumption of coffee in France, Germany, England, and the United States, and even in Central South America (the natives gradually preferring it to chocolate), and the safety of the crop, together with the cheapness of land and small cost in producing it, gives every assurance to the producers, of success in their operations, and, at the same time, holds out encouraging prospects for the prosperity of trade in general. I have also proposed to several English merchants the establishment of a coffee-planting company, which, in the present depressed and uncertain condition of mining and other operations, I am certain would return a safer and better interest on the capital invested than any other speculation. The coffee-tree is not liable to injury from insects or changes in the weather; it is easily cultivated; bears fruit for twenty-five years and upwards; and the produce is always saleable. The coffee market is never in a depressed state, and from the fact that there are few climates suitable for its culture, the probability of its increasing, rather than decreasing in value, is a matter beyond a doubt. The most important advantage to be derived from encouraging the investment of English capital in coffee-planting, is the fact that it would contribute to maintain that preponderance in the trade of Central America which we have hitherto possessed. Having in our hands the best and most productive lands, we secure the trade as effectually as if the country was our own, and reserve in our hands, on this coast, the monopoly of one of the most important and valuable articles in commerce. I have volunteered to superintend the general management, to purchase or lease the lands, and to make all the arrangements whereby a company, possessing a capital of from £50,000 to £100,000, might obtain a large tract of country suitable for the purpose. The Government of Salvador have, by a decree, exempted all the necessary labourers on a coffee estate from military conscription and from all municipal interference. They have also offered me every facility in procuring lands. According to the calculations I have made, founded on observation and experience, I consider a capital of £100,000 sufficient to purchase a tract of land capable of producing 6,000,000 trees. The amount of capital mentioned would be sufficient not only to purchase the land, but pay all expenses incurred in ditching and planting, the wages of the people employed, the erection of the houses, in fact all and every expense until the crops were gathered. The trees produce, generally, in four years after they are planted, and the first crop pays all the expenses of clearing, while the following year, or fifth, generally gives a considerable surplus for exportation. Thus, on the fifth or sixth year, at the usual and lowest estimate of 3lbs. per tree, we have a yield of 180,000 quintals, which, at 8 dollars per quintal, the current price at the ports of export, amounts to 1,440,000 dollars. To estimate the net value, we must deduct one-third for losses and expenses in clearing and preparing for market, also the interest on £100,000 for five years (the period which must elapse without receiving any returns), when the account will stand as follows; viz.:—

		Dollars.
Gross Product in five years of 6,000,000 trees	.	1,440,000
Deduct one-third losses and expenses	. .	480,000
" interest for five years at 5 per cent. on £100,000 . . . £25,000 =		125,000
Net profits .	. .	835,000

Equal to £167,000, which is the true estimate of the net value of the crop five or six years after planting. But even supposing that the trees yield $1\frac{1}{2}$lbs. coffee each, the sum of £83,500 would be the result.

Local Currency and Exports of Chantabun, or Chantaburi.—Chantabun, on the east coast of the Gulf of Siam, is supplied from Bangkok with all the necessary foreign goods. The chief imports are grey and white shirtings and long-cloths, coloured shirtings, red cloths, sarongs, and opium. As at Bangkok, nothing can be done in the way of barter, all produce having to be paid for in hard cash. The only coin current is the tical; dollars would not be taken at any rate. There is, however, a local currency, the privilege of coining and circulating which is purchased from the Government by a Chinese merchant. It consists of flat circular lumps of coarse glass, stamped with some Chinese characters, and bearing the fictitious value of salungs and fuangs. These are used like paper money, being convertible into silver on presentation at the shop of the issuer. The exports from Chantabun are pepper, sugar, aquila wood, timber for ship-building, cardomoms, sticlacs, hides, horns, fish, tobacco, gamboge, ivory, rhinoceros horns, wood, oil, and coffee. Pepper ranks first among the products, both in value and quantity. The usual amount grown is 38,000 piculs, viz:—

	Piculs.
At Chantabun	25,000
Tung Yai	8,000
Royong	5,000

The cultivation is entirely carried on by Chinese immigrants. The plantations are situated, for facility of irrigation, at the base of the mountains which surround the town. The plant (*Piper nigrum*) requires great care and attention in its culture, being subject to the devouring ravages of an insect. As a preventive against this, the plant is washed constantly with a strong decoction of tobacco. The vine commences to bear when three years old, and continues to do so till twenty. The fruit is ready for the market in March. Brown sugar, of excellent quality, is grown at Chantabun. The soil of Chantabun is well adapted for the growth of coffee. Aware of this, the King of Siam, some years since, ordered that it should be extensively cultivated. From ignorance of how to tend the plant, however, the plantations have gradually been given up, and the quantity produced annually now barely suffices for the consumption by foreigners at Bangkok. The annual supply of horns and hides is very considerable; the plain of Chantabun affords excellent pasturage for cattle, and the quantity of stock kept is large. One of the most important products of the Province is the valuable timber; first in rank is that called Mai-tikien, by the Siamese, and the botanical name of which is *Metrosideros vera;* this can be produced in any quantity, and at an extremely cheap rate. It is found on the mountains, and is easily accessible. When the Siamese first commenced to become large ship owners, some years back, nearly all their vessels were built at Chantabun, the proximity to the timber forests, and the facilities for the cutting and carriage of the wood presented there, rendering the place peculiarly eligible. Mai-Tikien was nearly the only timber employed, and it is only of late years, since the supply of teak from the Northern Provinces has become larger, that it has been less used. Now, however, large quantities of this wood are cut and exported to Bangkok, where it is very generally used by foreign and Siamese ship-builders, chiefly for keel-pieces and bottoms of ships, as, when kept submerged in water, is it superior to teak. Another valuable wood is the red wood (Mai-deng of the Siamese) sometimes erroneously called rose-wood. It is an extremely hard and heavy wood, of a deep red colour, susceptible of a fine polish, and well adapted for furniture. An extremely heavy timber is found also in the forest, called by the Siamese, Mai-Taklou. It is considered by them as incorruptible, and as such bears a sacred character, being much used in the construction of their temples. This corresponds to the "Nunclea Orientalis" of Lowreiro (Flora Cochin Chinensis).

Perhaps the most useful tree is that known in the Straits as the Pune. It is exceedingly plentiful, and is admirably adapted for masts and spars, as such it is much employed in the above localities. The Siamese and Cambodians, however use the tree for a different purpose, that is, for the production of oil, which is commonly known under the name of wood oil. It is used for caulking and varnishing vessels, and in the manufacture of torches so generally used by the Siamese. The method of extracting this oil is to make a deep incision in the trunk of the tree, a few feet from the base; in this a fire is kindled, and allowed to burn for some time, after which it is cleared out. The oil then commences to drop into this incision, which serves as a receptacle. As the minerals of Chantabun form no inconsiderable items in her commerce, they deserve some notice. Precious stones are found in great abundance, and might be a most profitable employment to hundreds. Rubies, sapphires, garnets, Oriental topazes, and emeralds, are the chief stones. They are all of good water. The sapphires and garnets are sold in the market at Chantabun, by the Chinese, at from 5 to 10 ticals per catty (12s. 6d. to £1 5s. per $1\frac{3}{4}$ lb.) These minerals were formerly largely exported to Bangkok, from whence they were sent principally to Java, but of late years the demand for them there has fallen off, and the collection has declined in a corresponding ratio. Large beds of coal have been discovered, but as there is no demand for this mineral it will probably be some time before an attempt is made to work them. The produce of the provinces adjoining Chantabun is conveyed thither in carts and on elephants, buffaloes, and oxen. The means of communication with the interior, by the existing roads, are far from easy, and during the rainy season impracticable. At that season, however, the dry water courses of the summer are swollen into navigable streams, and afford facilities for transport, generally availed of by the mountain tribes, who come down from the wilds to barter Cardomoms, gums, tiger-skins and bones, for salt and coarse cottons. Small junks, of from 80 to 150 tons burthen, are employed for the export of produce. The only port to which it is carried is Bangkok. The rate of freight between the two places is about 15 cents per picul. Chantabun does not appear to have been visited often by foreign ships. In 1851, the British brig "*Pantaloon*," called in there to buy a cargo, but the master was not allowed to open commercial negotiations, being told by the authorities that Bangkok was the only port open. Since the new treaty, which came into operation in April, 1856, one English vessel, the lorcha "*Speed*," visited the place, and could easily have procured a cargo had she waited; this she was unable to do, in consequence of her being under an engagement to proceed elsewhere.

Home Correspondence.

THE PATENT OFFICE.

Sir,—Although our Patent Law has lately been much disparaged, and it has been particularly urged against it that it opens a wide door for the patenting of inventions which cannot properly and legally be patented by reason that they have already been publicly known and used, or even patented before, and much has been said about the necessity of having Boards of Examiners and scientific judges to weed the Patent List of such pseudo inventions—I have not observed that any notice has been

taken of the fact that one thing which was intended to have had the effect of weeding the Patent List has been all but nullified by some counteracting force which seems difficult to discover or understand—I allude to the production, publication, and circulation of indexes, abstracts, and specifications, all which have received the attention of her Majesty's Commissioners of Patents and of the able Superintendent, Mr. B. Woodcroft, and his assistants, but they have been so "cribbed, cabined, and confined," that much that is admitted to be desirable is not provided for; and, furthermore, the principal place provided for access to these records—the Patent Office library and reading-room—is so small and ill-adapted for the purpose, that there is not sufficient space for half-a-dozen persons to pursue their researches in it, and therefore, practically, searching into the novelty of any so-called invention, is little less difficult than it was in olden time, 'ere the Patent Law of 1852 was enacted.

Again, the Patent Law has provided that opposition may be offered to the granting of improper patents, but here, too, the practical working of the Patent Law is almost a dead letter, owing to the unsatisfactory mode of conducting oppositions, and the great expense to be incurred.

From practical knowledge, I will venture to say that, if the searching for patents were made easy, searching required as a condition precedent to granting a patent, and oppositions rendered cheap and well regulated, the Patent Lists would be much weeded.

I trust that, at least, the Patent Office library will be placed on a better footing before the opening of the Exhibition of 1862, for I am sure we could not introduce any of our foreign scientific visitors to it without being put to shame and confusion.

I am, &c., F. W. CAMPIN.

Strand, November 1, 1861.

STEERING OF STEAM VESSELS.

Sir,—It is lamentable to hear, in this comparatively enlightened age, of the many accidents arising from collisions at sea and in rivers with steam-vessels—accidents that might easily be prevented.

About twelve years ago my attention was particularly drawn to this matter, from an emigrant ship, named the *John Bartlet*, being run down off Holyhead by a steamer, through which 120 unfortunate passengers and crew lost their lives. It came out in evidence on the inquest, that, although the day was foggy, yet the vessels saw each other 120 yards ahead; and notwithstanding each helmsman did his best to prevent accident, by putting his helm hard a-port, the collision was inevitable, and the sailing vessel was struck, stove in, and sank in about ten minutes, carrying down with her so many shrieking individuals.

Reflecting on the inadequacy of the helm to turn out of its course, on a sudden emergency, a large mass of matter in rapid motion, such as a modern steamer, I was led to take out a patent for steering steam-vessels by their motive power, simply by allowing each engine, or pair of engines, to work its own paddle in river navigation, or its own screw (having two) in rough seas. I showed that if a vertical shaft came up on deck from the throttle-valves, with a horizontal lever fixed to the top of the shaft, having an arrow's head at one end and a handle at the other, any boy might steer the ship by pointing the arrow the direction the ship was required to go. The movement would give more steam to one and less to the other engine or engines, and immediately the whole power on board would be employed to turn the vessel out of its course, and, if need be, the engine might be reversed, by which means a vessel might be made to turn round in the water without moving an inch forward.

Not being engaged in nautical matters myself, but believing this simple invention might be of great public utility, I not only communicated it to the Government, but to several eminent engineers and shipbuilders on the Clyde and Mersey. I showed to the former that vessels of war, being so constructed, might deliver a broadside, turn round and deliver the other whilst the first guns were being re-shotted, or might rake any other vessel of the ordinary construction, without its being able to get out of the way. For this communication I merely got thanked by the Lords of the Admiralty, but heard no more of it. The shipbuilders either turned a deaf ear, or told me they were not prepared to try experiments, and the aforesaid patent has remained a dead letter to this day—notwithstanding that hundreds of lives and hundreds of thousands of pounds' worth of property continue to be annually sacrificed—which so manifest and simple an expedient might prevent. The late disaster to the *Great Eastern* would never have happened had she been so constructed; although I never calculated that this principle could be carried out in sea-going paddle-steamers (at that time vessels were much smaller than they are built now), but having twice crossed the Atlantic in the *Great Eastern*, and witnessed the severe gale she met with on her passage out in May last, I have changed my opinion in that respect, and have no hesitation in saying that if her paddle-shaft were severed in the middle, and each pair of engines allowed to work its own paddle, she might not only be steered, but would be under perfect control in the severest weather. Although she rolls very much under certain circumstances, and did so on the occasion I have named, yet I never saw either of her paddles out of water, and the moment her course was changed a little to windward she became steady. (*Vide* report of her voyage.) Therefore it would be a very easy matter, whenever a hurricane overtakes her, and the wind happens to be dead on her beam, to put her off her course until its violence is expended. To make the matter, however, perfectly secure in sea-going paddle-steamers, it might be arranged to work the engines together or separate, at pleasure, by a clutch-box, so that if any slipping of a paddle-wheel should occur, or be apprehended by the ship being tossed in a tempestuous sea, then the engines could be coupled, and the clumsy helm resorted to for steering until the storm subsided. What I contend for is, that steering by helm should never be used except as an auxiliary in steam-ships. Vessels built with two screws might discard it altogether, or use it only in case of accident to one of the screws.

I think it a great pity that the fine iron-clad steamers now being built by our Government are not on this principle, and ask what chance they would have, or how they could possibly defend themselves against an enemy's ship constructed so as to turn in any direction? The latter, if only a small gun-boat, armed with a few heavy guns, could so place itself as to hammer away at the stern and rudder of its opponent, and in a few minutes render useless and unmanageable the beautiful and costly ships that are now the pride of Old England, and by keeping up a raking fire make them an easy prey to an inferior enemy. I believe myself that in the new era of naval warfare now dawning upon us, the victory will not be to the "strong," but to the "swift" and "easily manageable" vessels; and the nation that first excels and keeps a-head in that respect will alone be mistress of the seas. Such ships as are now building of the *Warrior* class, although an immense improvement upon the old "wooden wall" sailing vessel, are, I submit, not the kind required. Steam has done much for us, and on the superior application of that agent we must rely, rather than put our trust in steel plates. Depend upon it, our Government are on a wrong tack in the present construction of their ships. They would have no more chance against smaller ships, properly constructed, so as to sail fast and twist in any direction, than had the Spanish Armada of old against the little ships of glorious Queen Bess. Guns are now being made that will smash in the strongest iron plates, and the latter, it is already evident, will have to succumb to the projectile; therefore, one has only to imagine the destructive effect of a little wasp-like steamer,

armed with a few 400 or 600 pounders, getting under the stern of our big ships, and rendering them, in a few minutes, as helpless as so many floating tubs. If our Government does not take the initiative about this steering question, they will shortly find they will be anticipated by—and our country will be at the mercy of—some foreign power, until they have retraced their steps, when it may possibly be too late. It is nonsense to say that such a thing cannnot be carried out. It can be done—and will be done. I point out this danger, and warn them that they may awake some fine morning and find out that the millions they have been expending might just as well have been thrown into the sea.

I am, &c., EVAN LEIGH.

Collyhurst Works, Miles Platting, Manchester.

Proceedings of Institutions.

LONDON MECHANICS' INSTITUTION.—On Friday last, November 1st, Sir Thomas Phillips, F.G.S., Vice-President and Chairman of the Council of the Society of Arts, presided at the London Mechanics Institution, and distributed the prizes and certificates awarded by the Society of Arts to the successful candidates, and also a number of prizes given by the Local Board. The CHAIRMAN, in opening the proceedings, explained the object of the Society of Arts in establishing its annual examinations, and adverted to the importance of the certificates and prizes to their possessors, as testimonials of ability and industry, for which they were not beholden to personal friends, but which they had themselves fairly earned. He then stated the conditions on which the prizes and certificates were awarded, and complimented the London Mechanics' Institution and its Local Board on the important part they had taken in the examinations, and the success of their candidates from the commencement to the present time.—Mr. T. A. REED, the Hon. Secretary of the Local Board, made a comparative statement, showing the increasingly beneficial results that had attended the Society of Arts Examinations in connection with the Institution, in stimulating the members to diligent systematic study, and providing them with the best testimonials of proficiency in the various branches of education. He stated that on three occasions the Local Board had attained prizes from the Society for the large proportion of successful candidates, and had appropriated the money, together with some voluntary donations, to the purchase of books, to be distributed as prizes among the most successful students in the principal classes of the district. He expressed his regret that that source of revenue would no longer be open to them, as the prizes to Local Boards were to be discontinued; and made an appeal to the friends of the Institute to supply the funds which would be needed to keep up the Local Board's own examination with effect. Mr. Reed stated that in 1858 twelve candidates were examined by the Local Board, eight of whom were passed, and five obtained certificates. In 1859, eleven were examined by the Local Board, nine of whom passed, and eight obtained certificates. In 1860, fifteen were examined by the Local Board, and eleven passed, all of whom obtained certificates, together with two first-class prizes and one second-class. In 1861, nineteen were examined by the Local Board, fourteen passed, and again all were successful in gaining certificates, together with two first-class prizes and one second-class. Book prizes had been awarded to five classes in 1859, seven classes in 1860, and nine classes in 1861. The Chairman then presented the certificates and prizes from the Society of Arts to the successful candidates, whose names have already appeared in the *Journal*. The book prizes awarded by the Local Board were next presented:—Arithmetic, W. J. Gadsden; chemistry, D. E. Gostling and H. K. Worth; shorthand, J. Reeson; French, J. H. Howard and H. G. Field; writing, Miss Tapping and E. W. Barnes; grammar, Miss S. M'Gregor; geography, E. Francis; landscape drawing, T. J. Clare and W. J. Le Maitre; architectural drawing, T. J. Handford and J. Le Maitre. The CHAIRMAN, the Hon. DUDLEY CAMPBELL, and others, addressed the audience, pointing out the advantages of education, and the utility of such institutions as the London Mechanics' Institute, which tended to keep up and augment, by means of evening classes and mutual instruction, the information which had been acquired at school. On the motion of Mr. G. Legg, one of the successful candidates, seconded by Mr. J. Alger, a vote of thanks was accorded to the Local Board, which was acknowledged by the Rev. C. Boutell, Chairman of the Board. The proceedings were brought to a close by the usual vote of thanks to the Chairman.

PORTSEA ATHENÆUM AND WATT INSTITUTE.—On Tuesday, the 15th Oct., an Industrial and Fine Art Exhibition immediately connected with these united Institutes, was opened at the Queen's-rooms, Portsea. The object of the united committees, who have been unceasing in their endeavours to invest this exhibition with a degree of interest hitherto unprecedented in these parts, has been to further the welfare and general prosperity of both the Institutes with which the exhibition is immediately identified. It is hoped that by means of the exhibition the prospects of the united societies will be brightened. As far as the arrangements have as yet progressed, nothing appears to be wanting, and success for the undertaking is confidently augured. Every available requisite has been introduced, and the products, natural and artificial, of almost every clime have been collected together for the purpose of affording both amusement and instruction. The exhibition is under the immediate patronage of the Worshipful the Mayor (C. B. Hellard, Esq.); the Right Hon. Sir Francis T. Baring, Bart., M.P.; Sir James D. H. Elphinstone, Bart., M.A.; Vice-Admiral Sir H. W. Bruce, K.C.B., Naval Commander-in-Chief; Major-General Lord William Paulet, C.B., Lieut.-Governor; Rear-Admiral Hon. G. Grey, Superintendent of the Dockyard; Colonel J. W. Gordon, C.B., A.D.C., Commanding Royal Engineers; and other heads of Government and other departments who, with private individuals, on being appealed to by the united committees, for the loan of objects worthy of exhibition, made a hearty and generous response. Contributions have been forwarded to the committees from almost all parts of the borough and suburbs, and space alone has been needed to arrange satisfactorily the disposal of the articles sent, and to make the second Industrial Exhibition all that its originators hoped for or designed. The contributions have not been confined to Portsmouth alone. Her Majesty the Queen has placed her name amongst the long list of contributors, and the curiosities sent by her Majesty occupy the most prominent position in the room. The Prince Consort has also forwarded contributions, as also have Sir F. T. Baring, Lord Palmerston, and others occupying distinguished positions in the country. At the inauguration there were present the Presidents of the Athenæum and Watt Institute (Major-General Whylock and Andrew Murray, Esq.), the Rev. S. Phelps (Chaplain of the dockyard), Colonel-Commandant Anderson, G. Gillman, Esq.; B. W. Carter, Esq.; W. H. Garrington, Esq.; Rev. N. S. Godfry, Incumbent; Rev. J. H. Cooke, Rev. H. Hawkes, Mr. J. Shepherd, Mr. H. Emanuel, and other gentlemen, among whom were members of the Managing Committee. The Rev. E. S. Phelps offered up a suitable prayer, after which Major-General Whylock said, that being president of the senior or elder Institution, it devolved upon him to say a little in reference to the proceedings of the day. The objects of the committee were twofold—to foster amongst all classes in the locality a taste for the beautiful in nature and art, and to convey, through objects presented to the eye, instruction to the mind. To enable the Institutions which the joint committees represented more effectually to carry out the purposes for

which they were established, viz., the engaging of high class lecturers and professional artistes, and extending the Institute libraries, reading rooms, and classes.—Mr. Andrew Murray said, as President of one of the Societies, he had been requested to say a few words. The labour of collecting and arranging the articles now exhibited was undertaken and carried out by members of a committee of the two united Institutions, and through their influence, with that of their townsmen, it was that they had brought so large a collection for exhibition. It was most important to provide a sort of amusement that would not debase, but tend to elevate the human character. A pleasing feature in the general feeling for amusement was, that those species of entertainments which included wives and children were more appreciated than others in the present day.

MEETINGS FOR THE ENSUING WEEK.

MON. ...Geographical, 8½. 1. Lieut.-Col. H. A. Sarel, "Expedition to the Upper Yang-tse-Kiang, in China." 2. Capt. C. D. Cameron, F.R.G.S., "Notes, Geographical, Ethnological, Statistical, &c., on the Caucasus."
Medical, 8½. "Clinical Discussion."
TUES. ...Civil Engineers, 8. Mr. James A. Longridge, "The Hooghly and the Mutla."
Syro-Egyptian, 7½. 1. Dr. Solowicz, "Did the Egyptian Interpreters belong to the Priests or not?" 2. The Rev. B. H. Cowper, "The Metals of the Bible."
Zoological, 9.
WED. ...Royal Soc. Literature, 4½.
THURS...Philological, 8.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, October 25th*, 1861.]

Dated 15th October, 1861.

2567. W. Ross, Glasgow—Imp. in constructing taps or valves.
2568. J. Gilbert, Church-street, Old Kent-road—Imp. in endless railways.

Dated 16th October, 1861.

2571. J. Dixon and R. Clayton, Bradford—Imp. in the construction of railway wheels.
2573. F. B. Baker, Sherwood-street, Nottingham—Imp. in dressing or stiffening lace and other fabrics.
2576. A. V. Newton, 66, Chancery-lane—Imp. in the construction of grain and grass harvesters. (A com.)
2577. W. Biddell, Birmingham—Imp. in the manufacture of shot.
2579. J. Lister and D. Myers, Caledonian-street, Bradford—Imp. in lifting or hoisting apparatus, whereby to ensure the safety of the cage or article lifted when a rope or chain breaks, or is overwound, and in hoists generally as applied to mills, warehouses, and other buildings.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

2556. G. Twigg, Birmingham—Imp. in clasps or fastenings for stay-busks.—12th October, 1861.
2561. B. Taylor and C. Edkins, Birmingham—Imp. in porterobes or dress-suspenders, and also in apparatus for the suspension of curtains, draperies, and other articles.—14th October, 1861.
2575. J. J. Adams, New York—A new and useful imp. in the manufacture of flexible back brushes for cleaning and dusting horses and other animals.—16th October, 1861.
2580. W. Smith, Salisbury-street, Adelphi—Imp. in the apparatus for and method of increasing the illuminating power of gas. (A com.)—17th October, 1861.

[*From Gazette, November 1st*, 1861.]

Dated 24th June, 1861.

1614. R. Moore, Cannon-street West—Imp. in the construction, steering, and propelling of ships and other floating bodies and appliances adapted thereto.

Dated 25th June, 1861.

1618. W. E. Gedge, 11, Wellington-street, Strand—Improved means or apparatus for doubling and twisting the threads of any textile matter with any material susceptible of being carded or combed. (A com.)

Dated 28th June, 1861.

1656. S. Middleton and J. Wright, 42, Bridge-street, Blackfriars—Imp. in apparatus for the manufacture of boots and shoes.

Dated 18th July, 1861.

1807. B. Johnson, 1, Surrey-place, Kennington-park, and W. H. Anderson, White-cottage, Stockwell-place, Surrey—Imp. in pianofortes.

Dated 30th August, 1861.

2164. H. Lecaudey, 11, Wellington-street, Strand—Improved apparatus for succouring persons interred before life is extinct. (A com.)

Dated 2nd September, 1861.

2185. W. Clark, 53, Chancery-lane—Imp. in signal apparatus applicable for the prevention of railway trian collisions. (A com.)

Dated 6th September, 1861.

2224. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Imp. in the application of the Archimedean screw to the production and transmission of motive power, and in the apparatus connected therewith.

Dated 7th September, 1861.

2239. J. Carpendale and T. Middleton, Sheffield—Imp. in means of producing raised chasing on copper, silver, and Britannia metal by the application of pressure.

Dated 13th September, 1861.

2282. C. Sutton, Salford—An improved method of, and apparatus for, indicating the position of sunken ships or other vessels.
2283. H. Dixon, Pendleton, and J. R. Renner, Liverpool—Imp. in the mode of, and apparatus for, carbonizing sawdust and other vegetable substances.

Dated 16th September, 1861.

2308. W. Stewart, Peckham—Imp. in apparatuses for supporting persons in and for enabling them to progress through the water.

Dated 18th September, 1861.

2323. G. White, 7A, Pancras-lane—Imp. in apparatus for filtering or purifying water or other liquids. (A com.)

Dated 24th September, 1861.

2382. T. Davey, Camborne, Cornwall—Imp. in the manufacture of safety fuses, parts of which are applicable to the manufacture of pipes and tubes of lead and other soft metal, gutta percha, caoutchouc, bitumen, and earthenware.

Dated 28th September, 1861.

2424. S. W. Rix, Beccles, Suffolk—New and improved means of attaching or fixing woodwork, ironwork, fittings, or furniture to walls or buildings. (A com.)

Dated 2nd October, 1861.

2457. J. A. Coffey, Providence-row, Finsbury—Imp. in engines or apparatus for obtaining the motive power of steam, water, air, gas, or fluids.
2458. R. A. Brooman, 166, Fleet-street—Imp. in the manufacture of figured colored fabrics, and in machinery employed therein. (A com.)
2460. F. Brefit, King William-street—Imp. in machinery employed in cutting hollow and solid corks.

Dated 3rd October, 1861.

2469. R. J. Ellershaw, Leeds—An improved machine for expressing oil.

Dated 4th October, 1861.

2482. T. G. Ghislin, Hatton-garden—Imp. in the treatment or preparation of certain foreign plants or vegetable substances, and of the application of the same to various useful purposes, for which horn, shell, whalebone, indurated leather, fish, skin, ivory, bone, hard wood, and compounds of india rubber or gutta percha, have hitherto been employed.

Dated 5th October, 1861.

2492. J. S. Collins, Liverpool—An improved apparatus for reefing and furling the sails of ships and other vessels.

Dated 7th October, 1861.

2505. J. C. Willsher, Petches, Essex—Imp. in the construction of combined thrashing and dressing machines.

Dated 8th October, 1861.

2508. H. Willis, Albany-street, Regent's-park—Imp. in the construction of organs.

Dated 9th October, 1861.

2514. R. W. Sievier, Guildford-street, Russell-square—Imp. in batteries for the purposes of war.
2515. I. Baggs, Green-terrace, and J. T. Parkes, Almorah-terrace, Middlesex—Certain imp. in the manufacture and treatment of india rubber and vulcanite as applied to various purposes.

Dated 10th October, 1861.

2535. J. Downs, Kingston-upon-Hull—Imp. in pumps and stops used for working hydraulic presses.
2539. A. English, Hatfield, Hertfordshire—Imp. in reins or apparatus for preventing harnessed horses from falling.

Dated 12th October, 1861.

2545. J. Clark, Glasgow—Imp. in electric telegraph apparatus.
2552. H. Nelson, Manchester—Imp. in machinery or apparatus for punching washers for throstles and other similar purposes.

Dated 14th October, 1861.

2557. E. R. M. V. de la Jousselandière, Nantes—Imp. in machinery for weaving cords and ropes.

Dated 15th October, 1861.

2569. W. E. Newton, 66, Chancery-lane—Imp. in the condensers and condensing apparatus of steam engines. (A com.)
2570. R. A. Brooman, 166, Fleet-street—Imp. in the method of, and apparatus for, propelling ships and vessels. (A com.)

Dated 16th October, 1861.

2572. R. A. Brooman, 166, Fleet-street—An imp. in plates for the table. (A com.)
2578. W. Clark, 53, Chancery-lane—Imp. in the means or apparatus for closing and securing mail bags and other packages. (A com.)

Dated 17th October, 1861.

2581. R. Hayes, Manchester—Imp. in gun and ammunition carriages.
2583. W. T. Weston, 4, Trafalgar-square—Imp. in screw wrenches.
2584. W. Welch, 27, King-street, Southsea, Portsmouth—Imp. in marine screw propellers.
2586. C. De Groote, Brussels—An improved instrument for corking bottles and other vessels.
2587. J. Tattersall, Preston—Imp. in the construction of carding engines used in the preparation of cotton and other fibrous substances for spinning.
2589. T. E. Merritt, Rochester—Imp. in apparatus for obtaining motive power.
2590. R. Aytoun, Edinburgh—Imp. in apparatus to be applied to chimneys or flues for improving the draught therein, and for preventing down draughts or the descent of smoke into apartments.

Dated 18th October, 1861.

2592. H. J. Distin, 9, Great Newport-street, Leicester-square—Imp. in metal musical wind instruments.
2594. J. Goucher, Worksop—Imp. in the beaters and drums used in thrashing machines.
2595. E. Peyton, Birmingham—Imp. in the frames of metal bedsteads.
2597. C. D. Abel, 20, Southampton-buildings, Chancery-lane—Imp. in apparatus for the simultaneous manufacture of white lead and vinegar. (A com.)
2598. C. H. Holt, Huddersfield—Imp. in steam engines and boilers and in apparatus connected therewith, part of which imps. is also applicable to raising and measuring fluids generally.
2600. W. Sadler, 11, Tredegar-place, Bow-road—Imp. in armour plated ships.
2601. P. Robertson, Sun-court, Cornhill—Imp. in the manufacture of cartridges. (A com.)
2603. T. W. Cowan, Greenwich—Imp. in the construction of breech-loading ordnance.
2604. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in braiding machines. (A com.)
2606. C. Cheyne, 19, Great George-street, Westminster, and T. B. Moseley, Lewisham—Imp. in the construction of apparatus for signalling on railways, by which imps. the signalling apparatus is rendered self-registering or recording, and also applicable for measuring and recording the speed of passing trains and the time of their passage, part of which imps. is applicable for recording the speed of trains where signalling is not required.

Dated 19th October, 1861.

2607. J. Webster, Birmingham—Imp. in manufacturing oxygen gas and obtaining certain other products.
2609. R. Mushet, Coleford, Gloucestershire—A new or improved manufacture of titanic pig metal or alloy of titanium and iron.
2610. T. Lepeinteur, Paris—Imp. in fastenings for gloves, belts, and other articles.
2611. T. Fearnley, Arcadia-street, Manningham, near Bradford—Imp. in steam hammers.
2613. J. Marshall, 10, Savile-row, St. James', Westminster—The collection, concentration, and transmission of sound, so as to facilitate the hearing thereof.
2615. J. Wainwright, Connaught-place West—Imp. in ventilating rooms and buildings.
2616. C. De Bergue, Dowgate-hill—Imp. in sleeper chairs for the permanent way of railways.
2617. W. C. Cambridge, Bristol—An imp. in the construction of harrows.
2618. F. J. Evans, Gas Works, Horseferry-road—An improved mode of and apparatus for carburetting gases for the purpose of illumination.
2619. H. Bloxam, jun., Shrewsbury—Imp. in sights for rifles and ordnance.

Dated 21st October, 1861.

2620. H. Lamplough, 113, Holborn-hill—Imp. in the means for igniting the wicks of candles and lamp wicks.
2621. C. McDougall, Manchester—Imp. in connecting and fastening the bands of covered steel or other materials used for crinolines.
2622. J. Smith, Bradford—Imp. in machinery or apparatus for combing cotton or other fibrous substances.
2623. J. T. Smith, Barrow-in-Furness, Lancashire—An imp. or imps in collecting the inflammable gases evolved from blast furnaces.
2627. W. E. Gedge, 11, Wellington-street, Strand—Imp. in the manufacture of flannel. (A com.)
2630. N. D. P. Maillard, Dublin—Imp. in ploughs.
2632. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in apparatus for facilitating the passage of trains up steep gradients on railways. (A com.)
2634. W. Connell, Sewardstone Mills, Essex—Imp. in machinery or apparatus for washing fabrics, yarns, wool, clothes, and other similar articles.

Dated 22nd October, 1861.

2635. H. Frost, Manchester—Imp. in apparatus for measuring fluids.
2637. R. Mushet, Coleford, Gloucestershire—An imp. or imps. in the manufacture of a certain metallic alloy.
2639. H. May, Tewkesbury—Imp. in goloshes.
2641. R. A. Brooman, 166, Fleet-street—Imp. in reaping machines. (A com.)

Inventions with Complete Specifications Filed.

2669. E. Chambers, Melbourne—The use of hydraulic power for the breaking, crushing, or pulverizing of quartz, blue stone, or other stone or mineral of any description, and the use of a wrought iron lever or jaw in machines for crushing quartz or any other mineral, and the use of steel teeth and steel shield pieces for the levers or jaws in such machines.—25th October, 1861.
2683. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Improved apparatus for ascertaining the presence and degree or cessation of vitality in the human body and in animals of the higher class, applicable to the semeiosis of health, disease, and death. (A com.)—26th October, 1861.
2686. J. L. Sicard, 4, South-street, Finsbury—An improved apparatus for purifying, measuring, and weighing grain, and oleaginous seeds.—26th October, 1861.

Patents Sealed.

[*From Gazette, November 1st*, 1861.]

October 31st.

1096. W. Scholes.
1098. M. Winkler.
1099. E. de Bassano and A. Brudenn.
1103. R. A. Brooman.
1107. W. Clissold.
1108. G. Mead.
1111. T. Bradshaw.
1112. G. Hayes.
1119. J, Johnson.
1134. T. Blackburn and M. Knowles.
1138. W. Johnson.
1139. W. Johnson.
1142. J. Drew.
1145. J. Burch.
1148. S. A. Beers.
1152. W. E, Gedge.
1196. H. J. Davies.
1234. A. Whyte & M. Macdonald.
1290. H. B. Barlow.
1296. W. Tasker, jun.
1304. W. E. Newton.
1350. J. H. Johnson.
1626. A. Sacré.
2056. G. T. Selby.
2072. J. Platts.
2228. E. J. Hughes.

[*From Gazette, November 5th*, 1861.]

November 5th.

1151. F. Defaye.
1158. T. Blackburn & M. Knowles.
1161. J. T. Massiaux.
1162. H. M. Nicholls.
1166. J. R. Hunt.
1168. E. Hoskins.
1170. H. Swan.
1172. C. Lenny.
1173. G. Carter
1175. J. Burch.
1178. H. Cater.
1179. I. M. Singer.
1186. L. W. Roddewig.
1188. A. L. E. Maulbon.
1190. J. F. L. Baddeley.
1195. J. Wareing.
1217. W. Clark.
1220. C. Oliver.
1223. W. Clark.
1225. J. Bullough & J. Bullough.
1231. J. H. Johnson.
1237. E. C. Kemp and T. Hall.
1240. H. Doulton.
1247. C. Stevens.
1272. J. W. Greaves.
1278. W. Clark.
1297. T. Sykes, B. C. Sykes, and J. W. Crossley.
1423. S. Moore.
1438. W. E. Newton.
1454. W. A. Sands.
1471. A. L. C. De Montagu.
1586. M. F. A. T. De Menonville.
1607. J. H. Johnson.
1684. H. B. Barlow.
1711. J. E. M. de Pradou and L. G. Lecoq.
1717. R. A. Smith.
1883. E. P. Colquhoun and J. R. Thomson.
1925. M. Merryweather and R. M. Merryweather.
1980. G. Haycraft.
1994. H. Wilde.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, November 1st*, 1861.]

October 28th.

2409. W. Munro.
2420. R. W. Chandler and T. Oliver.
2628. J. Easton, sen., and C. E. Amos.

October 29th.

2413. W. Kirrage.

October 30th.

2458. J. Fowler, jun., R. Burton, and D. Greig.
2479. R. E. Pinhey and J. Wood.

[*From Gazette, November 5th*, 1861.]

October 31st.

2429. G. Davies.

November 1st.

2449. N. S. Dodge.
2460. E. Fielding.

November 2nd.

2467. R. A. Brooman.
2478. S. Davey.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietor's Name.	Address.
4416	Oct. 26.	The Cornet Bustle	James Blurm and Dyson Mair	34, Castle-street, Oxford-street, W.
4417	,, 30.	Henry Gilbertson and Sons' Poison Bottles	Henry Gilbertson and Sons ...	40, Ludgate-hill, E.C.
4418	,, 30.	Washing Machine for the Million	Jno. Kelly	Brook-lodge, Roscommon, Ireland.

Journal of the Society of Arts.

FRIDAY, NOVEMBER 15, 1861.

COUNCIL.

The following Institution has been received into Union since the last announcement:—

Wolverhampton, Young Men's Christian Institute.

NOTICE TO MEMBERS.

The One Hundred and Eighth Session of the Society will commence on Wednesday, the 20th instant, at 8 o'clock, when Sir Thomas Phillips, F.G.S., Chairman of the Council, will deliver the opening address.

The chair will be taken at Eight o'clock on the following Wednesday evenings:—

1861.	November	—	—	20	27	
,,	December	4	11	18	—	
1862.	January	—	—	15	22	29
,,	February............	5	12	19	26	
,,	March...............	5	12	19	26	
,,	April	2	9	—	23	30
,,	May..................	—	7	14	21	28
,,	June	—	—	—	25*	

For the Meetings previous to Christmas the following arrangements have been made:—

November 20.—Opening Address by Sir Thomas Phillips, F.G.S., Chairman of the Council.

*** On this evening the Medals which were awarded by the Council for Papers read at the Weekly Evening Meetings during the last Session, and for articles submitted to the Society's Committees, will be distributed

November 27.—"Comparison of the Year 1851 with the Year 1861." By Blanchard Jerrold.

December 4.—"On the Building for the International Exhibition of 1862." By Capt. William C. Phillpotts, R.E.

December 11.—"On Railway Management, from the Traveller's Point of View." By Thomas Baker, Secretary to the Royal Indian Army Sanitary Commission.

December 18.—"On the Improvements and Progress in Dyeing and Calico-Printing since 1851." By F. Crace Calvert, F.R.S.

Through the courtesy of Messrs. Kelk and Lucas, the members are invited to inspect the building for the International Exhibition of 1862, on Saturday, the 30th inst., after one o'clock, p.m. A card has been forwarded to each member, admitting himself and one friend. Any member who has not received this should apply to the Secretary.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £436,400, have been attached to the Deed.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

Until this last week, the contractors have had the benefit of as fine weather as they could desire. In the early stages of the work a day's rain would have been the cause of serious loss: now, however, that the building is so far advanced, they are, to a certain extent, independent of rain or sunshine. Notwithstanding the recent change in the weather, nearly 1,100 men are at work.

The roofing of the south-eastern court is completed, as far as the ironwork is concerned, and as soon as it is glazed will be entirely covered in. The galleries around it are also finished. It can be seen that this court with its galleries will form a magnificent piece of exhibiting space.

In the eastern dome all the eight columns are erected as high as the point from which the ribs are to spring. Three of the windows are fixed, and the iron ribs of the nave, which are to form part of the support of the domes, are in their places. As soon as the corresponding ribs in the transept are raised, as well as those over the eastern entrance, the columns will be properly braced to them, and then the roofing of the dome itself will be commenced. In order to obtain extra support for the dome, the form and position of the staircases leading to the transept galleries, as originally designed, have been materially modified. The erection of the iron-work of the western dome has not yet been begun.

The small piece of ground which forms the entrance into the machinery shed from the west-end of the building, has been roofed over, thus connecting the western annexe with the northern extremity of the western transept. The ground on which the eastern annexe is to stand remains still uncleared, as it has not yet been determined whether it shall be levelled or retain its original slope, as is the case on the other side. It is intended that the entrance to this portion of the Exhibition shall be by means of a tunnel beneath the entrance to the Horticultural Society's garden. The refreshment arcades are being rapidly advanced; already the walls have risen to the height of one scaffold.

During the past week all the allotments to the different committees have been completed. The document which accompanies this allotment explains fully the difference between floor and hanging space, as the exact meaning of these terms is apt to be confounded. It is understood

* The Annual General Meeting: the Chair will be taken at Four o'clock. No Visitors are admitted to this Meeting.

that Her Majesty's Commissioners have also fixed the position and direction of the passages which are to be made in the building, in order to give free circulation to the public during the Exhibition.

Now that the period when the Exhibition opens is so near at hand, the question of the necessary approaches is being discussed by the press. An article in the *Athenæum* of the 2nd of November, devoted to this object, urges the adoption of Captain Fowke's plan for a road through Hyde-park, in order that immediate access to the building may be obtained from Tyburnia and the terminus of the Great Western Railway. The plan thus suggested, which seems highly feasible, is that of a road sunk beneath the level of the park, in the hollow which forms the boundary between Hyde-park and Kensington-gardens. The importance of such a road as this can scarcely be overrated.

The following are the Local Committees not previously published in the *Journal*:—

Arbroath.
The Provost, *Chairman.*
The Town Clerk, *Secretary.*

Aylesbury (for Central Bucks).
John Lee, Esq., LL.D., *Chairman.*
Thomas Dell, Esq., *Secretary.*

Birkenhead.
George Harrison, Esq., *Chairman.*
James Macelvie, Esq., *Secretary.*

Blackburn.
The Mayor, *Chairman.*
The Town Clerk, *Secretary.*

Cambridge.
The Mayor, *Chairman.*
C. H. Cooper, Esq., Town Clerk, *Secretary.*

Carlisle.
The Mayor, *Chairman.*
C. P. Hardy, Esq., *Secretary.*

Carnarvon.
The Mayor, *Chairman.*
Richard J. Davids, Esq., *Secretary.*

Clonmel.
The Mayor, *Chairman.*
J. T. Luther, Esq., *Secretary.*

Cookstown.
The Mayor, *Chairman.*
J. M'Geagh, Esq., *Secretary.*

Coventry.
The Mayor, *Chairman* and *Secretary.*

Denbigh.
The Mayor, *Chairman.*
The Town Clerk, *Secretary.*

Derby (for Derbyshire).
The High Sheriff and Mayor, *Chairmen.*
H. L. Kemp, Esq., *Secretary.*

Devonport.
J. W. Ryder, Esq., Mayor, *Chairman.*
The Town Clerk, *Secretary.*

Dorchester.
The Mayor, *Chairman.*
The Town Clerk, *Secretary.*

Dublin.
J. P. Sayers, Esq., M.P., *Chairman.*
W. E. Steele, Esq., M.D., *Secretary.*

Dundee.
Provost Jobson, *Chairman.*
Mr. Sturrock, *Secretary.*

Dunfermline.
The Provost, *Chairman.*
The Town Clerk, *Secretary.*

East Retford.
W. Fisher, Esq., Mayor, *Chairman.*
The Town Clerk, *Secretary.*

Elgin.
The Provost, *Chairman.*
The Town Clerk, *Secretary.*

Exeter.
The Mayor, *Chairman.*
The Town Clerk, *Secretary.*

Grantham.
The Mayor, *Chairman.*
The Town Clerk, *Secreta y.*

Greenock.
The Provost, *Chairman.*
The Town Clerk, *Secretary.*

Hartlepool.
The Mayor, *Chairman.*
The Town Clerk, *Secretary.*

Hereford.
The Mayor, *Chairman.*
The Town Clerk, *Secretary.*

Huddersfield.
W. Willans, Esq., *Chairman.*
W. Hastings, Esq.; E. Stavenhagen, Esq.; Jos. Rayner, Esq., *Secretaries.*

Hull.
Z. C. Pearson, Esq., *Chairman.*
John Loft, Esq.; Jas. Oldham, Esq., C.E., *Secretaries.*

Inverness.
The Provost, *Chairman.*
A. Dallas, Esq., Town Clerk, *Secretary.*

Kilkenny.
Thomas Power, Esq., Mayor, *Chairman.*
Pat Walters, Esq., *Secretary.*

Leeds.
S. Swan, Esq., junior, *Secretary.*

Leek.
Thomas Carr, Esq., *Chairman.*
Samuel Tatton, Esq., *Secretary.*

Limerick.
The Mayor, *Chairman.*
W. Carroll, Esq., *Secretary.*

Lincoln.
The Mayor, *Chairman.*
The Town Clerk, *Secretary.*

Liverpool.
The Mayor, *Chairman.*
The Deputy Town Clerk, *Secretary.*

Lynn.
The Mayor, *Chairman.*
The Town Clerk, *Secretary.*

Macclesfield.
The Mayor, *Chairman.*
T. U. Brocklehurst, Esq., *Secretary.*

Maidstone.
The Mayor, *Chairman.*
The Town Clerk, *Secretary.*

MANCHESTER.
R. E. Johnson, Esq., *Secretary.*

NEATH.
The Mayor, *Chairman.*
Dr. Alexander Williams, *Secretary.*

NEWTON ABBOT.
Elias Ford, Esq., *Chairman.*
St. John Vincent Day, Esq., *Secretary.*

NORWICH.
The Mayor, *Chairman.*
The Town Clerk, *Secretary.*

NOTTINGHAM.
W. Vickers, Esq., *Chairman.*
Sam. Collinson, Esq., *Secretary.*

PAISLEY.
The Provost, *Chairman.*
Wm. Hodge, Esq., *Secretary.*

PENZANCE.
The Mayor, *Chairman.*
R. Q. Couch, Esq., *Secretary.*

PORTMADOC.
Geo. Capon, Esq., *Chairman.*
Sam. Holland, Esq., *Secretary.*

PORTSMOUTH.
The Mayor, *Chairman.*
The Town Clerk, *Secretary.*

PRESCOT (LANCASHIRE).
Edmund Ward, Esq., *Chairman.*
Ed. Draper, Esq.; Jonathan Welsby, Esq., *Secretaries.*

REDRUTH.
Thomas Garland, Esq., *Chairman.*
John L. Peter, Esq., *Secretary.*

SALFORD.
The Mayor, *Chairman.*
Wm. Noar, Esq., Borough Treasurer, *Secretary.*

SCARBOROUGH.
The Mayor, *Chairman.*
The Town Clerk, *Secretary.*

SOUTHMOLTON.
J. E. J. Riccard, Esq., Mayor, *Chairman.*
R. M. Riccard, and John Cork, jun., Esqrs., *Secretaries.*

STIRLING.
The Provost, *Chairman.*
T. Galbraith, Esq., *Secretary.*

STOCKPORT.
Ed. Walmsley, Esq., Mayor, *Chairman.*
Robert Holt, Esq., *Secretary.*

STROUD.
Chas. Hooper, Esq., *Chairman.*
E. C. Little, Esq., *Secretary.*

SUNDERLAND.
The Mayor, *Chairman.*
J. M'Rae, and S. Alcock, jun., Esqrs., *Secretaries.*

SWANSEA.
The Mayor, *Chairman.*
George Harry, Esq., *Secretary.*

WALLINGFORD.
John Hilliard, Esq., *Chairman.*
J. H. Marshall, Esq., *Secretary.*

WEDNESBURY.
Sampson Lloyd, Esq., *Secretary.*

WOLVERHAMPTON.
The Mayor, *Chairman.*
The Town Clerk, *Secretary.*

The following are the Foreign Commissions that have not previously appeared:—

ECUADOR.
Don Francisco Garcia Gaston, Consul for Ecuador, 75 Mark-lane, London, E.C., *Chairman.* Don T. Francisco Millan, Fiscal Commissioner of Ecuador. Mr. J. Gerstenberg, Chairman of the Ecuador Land Company. Mr. J. D. Powles, Chairman of the Ecuador Bondholders' Committee. Mr. H. Scherges, *Secretary.*

SAXE-ALTENBURG.
The Ducal Officers, Dresden.

URUGUAY.
Dr. Don. Manuel Herrera y Obes, *President*; and Don Xavier Alvarez, *Secretary*, Monte Video.

GREECE.
Alexander C. Ionides, Esq., Consul-General for Greece, will represent that nation at the coming Exhibition.

GRENADA.
A Commission of six members appointed; — Davison, Esq., *Chairman*; John Wells, Esq., *Secretary*, St. George's. London Commissioner, Thomson Hankey, Esq., M.P., Colonial Government Agent, 7, Mincing-lane, E.C.

JAMAICA.
Council of Royal Society of Arts, Kingston, appointed a Commission.

FEEJEE ISLANDS.
Local Commissioner, Mr. Consul Pritchard.

JAPAN.
Local Commissioner, Rutherford Alcock, Esq., Envoy Extraordinary and Minister Plenipotentiary, Nagasaki.

TUNIS.
Mr. Moses Santillana has been appointed as Second Commissioner for Tunis.

The following additional arrangements have been made:—

ITALY.
The Royal Italian Committee have decided to illustrate that period in the history of Italian Fine Arts at the approaching Exhibition commencing from the revival of taste by Canova, about 84 years ago.

The following Committee has been appointed in addition to those already published:—

CLASS 19 (FLAX AND HEMP).
Messrs. Dewar, H. Austin, and Dagnall.

It is stated that the number of exhibitors in the Austrian Department will be not less than 1,500, which may still be considerably increased. Considering that Hungary, Crotia, Slavonia, Transylvania, as well as some of the smaller Austrian provinces, are principally agricultural districts, this number promises a fair representation of the products of the empire.

SILK FROM THE PUNJAUB.

The *Manchester Guardian* says:—

Mr. H. Fleming, secretary to the Manchester Chamber of Commerce, has received, through the Lords of the Committee of Privy Council for Trade, some samples of silk grown by Mr. H. Cope, in the Umritsur district of the Punjaub; and also copies of correspondence between Mr. Cope and the private secretary to the Governor-General of India with regard to the same. The samples, which are at present at the offices of the chamber, in King-street, are to be submitted to the silk trade in this district, together with the correspondence; as in the letter addressed to Mr. Fleming it is requested that "my lords

may be favoured with the opinion of the chamber as to the character and commercial value of this silk, and especially whether it would command a sale in the English market, and if so what price would probably be obtained for it." The specimens are, we understand, from cocoons of the Kashmeer stock; and the secretary to the Agricultural and Horticultural Society of India, in reporting to Mr. Cope the discussion at a meeting of that society, when cocoons and some of the reeled silk were submitted, says:—"This silk was much admired by the members present as of first-rate quality, being of a very fine bright colour and good thread. It was considered that if the production could be extended, it would be a favourite silk in the English market." Mr. Cope, in his first letter to the Governor-General, stated this opinion, with some general information as to the plans he had adopted, adding, "My recent experiment may be considered to have finally and affirmatively decided the hitherto disputed question whether silk may be raised with advantage in this part of the Punjaub. . . . . . Land and labour are cheap, and the mulberry tree grows to perfection here." In his reply, the private secretary to Lord Canning says that his lordship has read the letters with much pleasure, and desires to be informed "what steps you have taken to make known in England the value of samples such as you enclose in your letter, and whether the government can be of any use in this respect." Mr. Cope answers that he will gladly make over the whole of his out-turn to be sent to England under the auspices of the Indian government. In subsequent letters he informs Lord Canning that he proposes to keep his operations on a limited scale this year (the correspondence was in July), but that he hopes to do more hereafter; that he has planted 3¼ acres with the *Morus multicarius*, and proposes to extend the area largely next year, if he can get land on favourable terms: that a friend had, on his strong recommendation, entered on a large plantation, where he had got 50,000 cuttings of the above mulberry shrub into the ground; and that the executive of the Barce Doab Canal were anxious to plant the shrub along the banks of their canal, and he hoped to have cuttings enough to supply them next year.

Home Correspondence.

STEERING OF STEAMERS.

Sir,—In your last number you insert a letter from Mr. Evan Leigh, of Manchester, on the "Steering of Steam Vessels."

In the case of the emigrant ship, *John Bartlet*, which was run down by a steamer off Holyhead, I deny that "the collision was inevitable." Had both helmsmen put their helms hard a-port it could not have occurred. Any captain of experience would soon settle this point.

I am one of those who think that a novel and important invention with a degree of feasibility in it, could not have met the fate of Mr. Leigh's. He admits that he is "not engaged in nautical matters," and complains that so "simple an invention" should not have been encouraged by those who are. Allow me to say, that among the "eminent engineers and ship-builders" he communicated with, I feel certain more than one would have been found to entertain an idea so rich in promise, had they not been well assured of its impracticability.

I am not at present going to discuss its principles, though I might easily show that the confident tone in which he writes is not warranted by his description; and I think it very far from being certain that "a vessel might be made to turn round in the water without moving an inch forward." How he can have arrived at this conclusion, without an experiment, is beyond my power of conjecture.

If in this comparatively enlightened age such appalling accidents could really be so easily prevented, it would be criminal in the highest degree to neglect any means to effect such prevention. Something, however, I have no doubt, will be elicited that will effectually convince the public that our eminent engineers and ship-builders, leaving government out of the question, are satisfied such a thing cannot be carried out, and have the best of grounds for arriving at this conclusion. I am, &c.,

JAMES KNOX.

Manchester, Nov. 9th, 1861.

Proceedings of Institutions.

Wakefield Mechanics' Institution.—The annual *soirée* of this Institute, on the occasion of its twentieth anniversary, was held on Thursday, the 31st October, and was numerously attended. The chair was taken by E. A. Leatham, Esq., and he was supported by Mr. Stansfeld, M.P.; Sir J. C. D. Hay, Mr. R. Smethurst, Mr. H. S. Wilde, the Mayor (T. Haigh, Esq.), Mr. H. Mason, Mr. R. Mackie, Mr. J. Leatham, Mr. C. Morton, Mr. Wilderspin, &c. The Chairman, after alluding to the general intellectual progress of the town, as shown by the increased interest in such Institutions as the present, spoke of the advantage of establishing a class for the study of Political Economy:—"Owing," he said, "to the general diffusion of information and the development of the thinking faculty among the people, which have been taking place through the agency of schools, Mechanics' Institutes, and above all of the cheap press, the time is passing away when great statesmen and great politicians can exclusively control the policy of nations, and we must expect less and less to see the wisdom of legislation accepted upon trust. Whether you enfranchise the people or not, they have reached that point at which they will meddle with affairs, and they may as well be taught to meddle wisely, upon sound principles, and with their eyes open to consequences, as left to meddle in that plight in which meddling is most dangerous; possessed of knowledge enough to lead them to question, to critisise, and to seek to control, but not of knowledge enough to enable them, in every instance, to set at defiance the plausible suggestions of interested men." In the course of his address the repeal of the paper duty, the American question, and the present political state of Europe, all came under review; and the Chairman concluded by impressing upon his hearers the importance of encouraging political and social progress. Sir J. C. D. Hay next briefly addressed the meeting, and was followed by Mr. Stansfeld, M.P. Mr. Smethurst and Mr. Wilde having also spoken, the usual complimentary votes were passed, and the meeting terminated.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...British Architects, 8. Mr. James Fergusson, "On the Mode in which Light was introduced into Greek Temples."
Medical, 8½.
Tues. ...Civil Engineers, 8. Continued discussion upon Mr. Longridge's Paper, "The Hooghly and the Mutla."
Ethnological, 8. 1. Dr. James Hunt, Hon. Sec., "Report of the Ethnological Papers read at the Meeting of the British Association at Manchester. 2. Mr. John Crawfurd, President, "On the Connection between Ethnology and Physical Geography.
Statistical, 8. 1. Mr. J. T. Hammack, "On the Proceedings of Section F of the British Association at its recent meeting at Manchester." 2. Mr. J. T. Danson, "On the Growth of the Human Body in Height and Weight, in Males, from 17 to 30 years of age."
Wed. ...Society of Arts, 8. Sir Thomas Phillips, F.G.S., "Opening Address."
Geological, 8. 1. Mr. J. H. Key, "On the Deposits at Bovey Tracey, Devon." Communicated by Sir C. Lyell, F.G.S. 2. Mr. T. Davidson, F.R.S., F.G.S., "On some Carboniferous Brachiopoda from the Punjab." 3. Signor G. G. Gemmellaro, "On some Volcanic Cones at the Foot of Etna." Communicated by Sir C. Lyell, F.G.S.
Meteorological, 7.

THURS...Numismatic, 7.
Chemical, 8. 1. Dr. Thudichum, "On Leusic Acid." 2. Dr. Bence Jones, "On Crystallised Phosphate of Lime in urine." 3. Dr. Oppenheim, "On the Camphor of Peppermint."
Linnean, 8. Mr. C. Darwin, M.A., F.R.S., "On the two Forms, or Dimorphic Condition, in the species of *Primula*; and on their remarkable sexual relations."
SAT...... R. Asiatic, 3.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, November 8th*, 1861.]

Dated 1st July, 1861.

1672. F. Potts, Lombard-street, and R. Cox, Birmingham—An improved mode of treating tubes used for posts for metallic bedsteads and other purposes, and in the machine for producing the same, and which said machine is also applicable for cutting out and piercing articles of sheet metal such as washers, metallic bucket ears, and other such like articles.

Dated 17th July, 1861.

1795. J. H. Butterworth, Rochdale—An improved mode of, and apparatus for, heating water and other fluids. (A com.)
1796. J. H. Butterworth, Rochdale—An improved mode of, and apparatus for, heating air, and for desiccating wet or moist substances. (A com.)

Dated 8th August, 1861.

1968. J. Eastwood and T. C. Eastwood, Manchester-road, Bradford—A new kind of yarn, being a combination of refuse and waste matters of fibrous materials, and the said fibrous materials and the cloth woven therefrom.
1975. G. H. Bovill, Durnsford Lodge, Wimbledon—Imp. in ships of war and other vessels, and in the manufacture of armour and other plates of wrought iron.

Dated 9th August, 1861.

1981. A. J. Mott, Liverpool—Imp. in apparatus for drawing beer and other liquids from casks and other vessels, and in excluding the air from the liquids in or remaining in the said vessels.

Dated 23rd August, 1861.

2113. G. T. Bousfield, Loughborough-park, Brixton—Imp. in apparatus for feeding boilers. (A com.)

Dated 30th August, 1861.

2162. J. S. Matthews, Moore Cottage, Bowling-green-street, Kennington-park—Imp. in the manufacture and preparation of starch, and in the apparatus employed therein.

Dated 5th September, 1861.

2212. J. T. Pensam, 55, Stambord-street, Blackfriars—Imp. in wheels for facilitating the progress of carriages on common roads, and in the means of propelling the same.

Dated 16th September, 1861.

2313. W. Tuxford, Boston, Lincolnshire—Imp. in thrashing machines and in raising and stacking straw and other agricultural produce.

Dated 21st September, 1861.

2363. H. Cockey and F. C. Cockey, Frome Iron Foundry—Imp. in apparatus employed in the manufacture of gas.

Dated 1st October, 1861.

442. W. E. Matthews, Sea View, St. Helens—An improved apparatus for conveying a line or other medium of communication from a ship or vessel for the purpose of obtaining relief or assistance in case of shipwreck, or for any other purpose to which the invention may apply.

Dated 2nd October, 1861.

2451. A. D. Bishop, 13, King-street, Cheapside—Imp. in pumps.

Dated 4th October, 1861.

2474. J. Stuart, 5, Vulcan-place, Castor-street, Poplar—Imp. in the treatment of oils obtained by the distillation of bones and other animal matters for the purpose of obtaining matters which may be used as pigments and dye stuffs.

Dated 5th October, 1861.

2487. J. Lansley, Brown-Candover, Hants—Imp. in the construction of ploughs, drills, scarifiers, and such like agricultural implements, the said imp. relating to the mode of steering and guiding the same.

Dated 8th October, 1861.

2511. S. Bremner, Belle Sauvage Works, Ludgate-hill—Imp. in the construction of printing machines, and in driving or actuating the same.

Dated 10th October, 1861.

2537. W. Payne and J. Burgum, Birmingham—Improved packing for engines and machinery.

Dated 11th October, 1861.

2540. C. N. Kernot, Gloucester-house, West Cowes, and M. D. Rucker, 116, Fenchurch-street—Imp. in the method of obtaining ammoniacal salts and other valuable products from liquors or substances containing ammonia, and for utilising he residuum.

Dated 12th October, 1861.

2548. S. R. Carrington, Stockport—Imp. in hats and caps.

Dated 17th October, 1861.

2588. T. Wild and T. Hodson, Heywood, Lancashire—Certain imp. in the method of, and apparatus for, heating the "feed water" for steam boilers, and in employing steam produced by such means.

Dated 18th October, 1861.

2591. W. Crome, Kilmerston, Radstock, near Bath—Imp. in lamps.
2599. W. Streather, Raunds, Northamptonshire—Imp. in the construction of wind engines, and in the structure containing the same, parts of which are applicable in the construction of windmills.
2605. H. Macmeikan, Stratford, Essex—Imp, in smelting copper, gold, and other ores. (A com.)

Dated 21st October, 1861.

2631. J. Toward, Newcastle-upon-Tyne—Imp. in machinery or apparatus for bending iron.
2633. J. Toward, Newcastle-upon-Tyne—Imp. in armour plates for ships, and in securing the same to the sides of a vessel.

Dated 22nd October, 1861.

2636. G. England, New-cross, Surrey—Imp. in planing machines.

Dated 23rd October, 1861.

2642. G. Archer, Raunds, Northamptonshire—Imp. in sewing boots and shoes.
2644. A. Bevan, Gravesend—Imp. in the construction of iron vessels and iron plated ships of war.
2645. S. Young, Belfast—Imp. in the spindles and flyers of machinery employed for spinning and twisting flax, hemp, jute, cotton, silk, wool, and other fibrous substances.
2648. H. Keach, 16, Bedford-terrace, Andover-road, Holloway—An imp. in the manufacture of segars.
2649. J. F. V. Deliry, Soissons, France—An improved mechanical kneading trough.
2650. A. Morel, Roubaix, France—A new machine for combing all filamentous materials.
2651. J. Kirkwood, Paisley—Imp. in looms for weaving.
2652. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in railways and in iron pavements and railways combined, part of which imps. are applicable to the construction of railway chairs and to cast iron pavements for ordinary streets. (A com.)
2653. R. Crammond, Newtown, Roxburgh—Imp. in self-acting railway signals.
2654. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in preventing and removing deposit in steam boilers and other vessels, and in the apparatus employed therein. (A com.)
2655. J. Marshall, Great George-street, Westminster—Imp. in traction engines and wheels, and in carriages to be drawn by traction engines, which imps. in wheels are applicable to common road carriages generally.
2656. I. L. Pulvermacher, Oxford-street—Imp. in apparatuses for the production of galvanic and magneto-electric currents, and in machinery employed in making some of the apparatuses.
2657. Lieut. W. B. Lord, R.A., Plymouth—An improved plug and socket or apparatus for closing and opening passages for the flow of liquids and fluids.

Dated 24th October, 1861.

2659. J. Baker, Birmingham—An imp. or imps. in ever-pointed pencil cases.
2660. A. F. Kemble, Great Plumstead, Norfolk—Imp. in railways.
2661. T. Morris, R. Weare, and E. H. C. Monckton, 4, Trafalgar-square—Imp. in magnets, induction coils, and in insulating wire and metal for electric and other purposes.
2662. J. C. Heaton and J. Dean, Rotherham—Imp. in the construction of taps or cocks.
2663. W. Dicks, Floore, Northamptonshire—Imp. in water meters.
2664. J. Chesterman, Sheffield—Imp. in heating steel and iron, and in hardening and tempering steel, and in apparatuses employed therein.
2665. J. McCall, Houndsditch, and G. Sloper, Walthamstow, Essex—An imp. in the preservation of articles of food.
2666. R. A. Boyd, Southwark—Imp. in apparatuses for singeing pigs.

Dated 25th October, 1861.

2671. E. Green and E. Green, jun., Wakefield—Imp. in apparatuses for generating, superheating, and condensing steam.
2673. L. Aron, 4, South-street, Finsbury—Imp. in cravats and their mode of attachment.
2675. T. Moore, 33, Regent-circus, Piccadilly—Imp. in windlasses and in checking or stopping chains worked thereby.
2679. J. Lobb, Dartmoor—Imp. in gunpowder suitable for blasting.

Dated 26th October, 1861.

2681. N. Cox, Chester—Imp. in the mode of connecting and attaching "armour" plates when applied to ships, forts, batteries, and such like.
2689. J. L. Norton, Belle Sauvage-yard, Ludgate-hill—Imp. in beating, stretching, and drying fabrics, and in the apparatus employed therein, part of which apparatus is also applicable for thrashing linseed. (Partly a com.)
2691. W. Taylor, Newport Pagnell—Imp. in joints or connections for metal and other pipes and tubes.
2693. G. Hutton, Manchester—Imp. in hats, caps, and other such coverings for the head.

Dated 28th October, 1861.

2695. E. McClintock, 100, Fleet-street—Imp. in the manufacture of soda and sulphuric acid.

2697. G. W. Watson, Surrey Docks, Rotherhithe—An improved mode or method of reefing fore and aft sails.
2699. W. Clark, 53, Chancery-lane—Imp. in the means of obtaining and producing printing surfaces. (A com.)
2701. C. Audouy, Paris—Imp. in the mode of and apparatus for raising sunken ships and other sunken bodies, and also in structures or apparatus intended for being purposely sunk and raised.

Dated 29th October, 1861.

2703. O. Bayliss, Birmingham—Imp. in double sighted double rifle guns for military and sporting purposes.
2707. F. Bennett, Bagillt, Flintshire—An imp. in the manufacture of spelter.
2709. W. Savile, Hounds-gate, Nottingham—Imp. in machinery or apparatus for the manufacture of elastic surgical stockings, socks, knee caps, belts, bands, or other articles.
2711. J. Eaglesfield, Devizes—Imp. in gas burners.
2713. M. Scott, Parliament-street, Westminster—Imp. in hydraulic presses.
2715. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in machinery for enamelling moulded and other surfaces. (A com.)

Dated 30th October, 1861.

2719. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Imp. in the construction of horticultural cases. (A com.)
2721. E. Boden, Worsley Mills, near Manchester—Certain imp. in the construction of lamps.
2727. J. L. Norton, Belle Sauvage-yard, Ludgate-hill—Imp. in apparatus for raising water. (A com.)
2729. R. A. Brooman, 166, Fleet-street—An improved steel button, and method of manufacturing the same.

INVENTION WITH COMPLETE SPECIFICATION FILED.

2756. J. Wright, 42, Bridge-street, Blackfriars—Imp. in the method of, and apparatus for, separating foreign matters from the droppings from carding machines, and for returning the residue thereunto. (A com.)—2nd November, 1861.

PATENTS SEALED.

[*From Gazette, November 8th*, 1861.]

November 8th.
1197. W. Wilson.
1198. C. W. Lancaster.
1202. G. F. Jones and J. Jones.
1207. F. Puls.
1214. T. Bell.
1226. G. S. Goodall.
1228. R. A. Brooman.
1255. B. Hudson.
1268. W. H. Bennett.
1270. G. Nevill.
1947. M. A. F. Mennons.
2301. M. Rae.

[*From Gazette, November 12th*, 1861.]

November 12th.
1222. A. F. Hildebrand.
1229. R. W. Woollcombe.
1233. J. Chedgey.
1235. J. Wooller.
1239. W. Mitchell.
1243. W. Jackson.
1246. F. N. Gisborne.
1248. W. R. Bowditch.
1252. C. Clay.
1253. D. K. Clark.
1259. S. Tearne.
1260. S. Pitts.
1261. A. Allan.
1262. J. C. M. Beziat.
1267. P. Ashcroft.
1276. F. O. Ward.
1287. A. J. Robertson.
1293. W. P. Dreaper.
1322. E. H. C. Monckton.
1334. G. H. Birkbeck.
1371. T. Coradine.
1565. W. E. Newton.
1894. E. H. Joynson.
1942. J. Potter.
2046. T. Settle.
2101. T. F. Doyle.
2232. W. Wild.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, November 8th*, 1861.]

November 4th.
2505. J. L. Jullion.

November 5th.
2481. H. N. Penrice.
2490. J. Platt.
2508. J. Felix.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID, AND DATES OF THEIR PRODUCTION FOR CERTIFICATE.

[*From Gazette, November 12th*, 1861.]

November 7th.
2761. M. Henry.

November 8th.
2507. A. Henderson.
2516. R. M. Ordish.
2518. J. Corner.
2535. J. Rae.
2545. J. Wadsworth.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, November 8th*, 1861.]

2343. J. Betteley.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID, AND DATE OF THEIR PRODUCTION FOR CERTIFICATE.

November 6th.
2446. H. R. Ramsbotham and W. Brown.

[*From Gazette, November 12th*, 1861.]

November 8th.
2393. J. Wain.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietor's Name.	Address.
4419	Oct. 31.	Universal Telescope Spring, or Elastic Blind Pulley	W. Purkis Jones	Nichols-square, Hackney-road.
4420	Nov. 4.	Gas Pipe Wrench	W. Pope and Co.	Temple-street, Bristol.
4421	,, 7.	The United Service Travelling Case ...	Messrs. Mechi and Bazin ...	112, Regent-st. and 4, Leadenhall-st.

LIST OF PRESENTS.

The following presents have been made to the Society during the past year. The thanks of the Society have been forwarded to the donors:—

PRESENTS.	DONORS.
Specifications of Patents up to the present time, and indexes	Commissioners of Patents.
Abridgement of ditto	,,
Commissioners of Patents Journal	,,
The Foot and its Covering by James Dowie	The Author.
American Civil War, Correspondence with Mr. H. C. Carey, of Philadelphia	Mr. Dawson.
Report of the Twenty-ninth Annual Meeting of the Literary Association of the Friends of Poland	
Cenni Indirizzati all'Associazione Ionia, Nella Sua Sedata del 6 Giuglio, 1861. H. Drummond Wolff, C.M.G.	The Author.
Ceremonies connected with the opening of the building for a Free Public Library and Museum, presented by Wm. Brown, Esq. to the town of Liverpool	The Borough of Liverpool.
Canada; a true outline of her geographical position, production, climate, &c.	
Fourth Annual Report of Executive Committee, Manchester Cotton Supply Association	The Association.
A Short Account of an Improved Cannon, and of the machinery and processes employed in its manufacture, by Daniel Treadwell	The Author.
On the Practicability of Constructing Cannon of greater calibre, capable of enduring long continued use under full charges, by Daniel Treadwell	The Author.
Report of Yorkshire Union of Mechanics' Institutions at Twenty-fourth Annual Meeting	Institution.
Minutes of Proceedings of the Institution of Civil Engineers, Vol. XVIII.	Institution.
Useful Information to Engineers (Second Series), by W. Fairbairn	The Author.
Transactions of the Historic Society of Lancashire and Cheshire, Vol. XII. Session 1859–60	Society.
Report to the Mayor and Corporation of Wisbech, upon the Improvement of the River Nene from Peterborough to the Sea, by Thomas Page, C.E., &c.	The Author.
Papers and Proceedings of the Royal Society of Tasmania, Vols. I. and II., and Vol. III., Parts 1 and 2 and Supplement (Meteorological Tables, 1856-7-8)	Society.
The Elements of Banking; with Ten Minutes' Advice about Keeping a Banker's Books, by J. W. Gilbart, F.R.S.	The Author.
24th Annual Report of the Council of the Art Union of London, 1860.	Art Union.
Transactions of the Institution of Naval Architects, 1860, Vol. 1	Council of Institute.
Transactions of the New York State Agricultural Society, 1859	Society.
Transactions of the R. Society of Edinburgh, Vol. XXII., Part 2	,,
Proceedings of the R. Society of Edinburgh, 1859—60	,,
Appendix to the Makerstoun Magnetical and Meteorological Observations	,,
Journal of the Royal United Service Institute, Vol. IV., No. 14	Institute.
Report on the Explosion of Gunpowder by Electricity, by Messrs. Wheatstone and Abel	Lord Herbert (Sec. of War).
Proceedings of the Royal Irish Academy, Vol. VII., Nos. 1-8	Academy.
Proceedings of the Scottish Shipbuilders' Association, Nos. 1, 2, 3, 4.	
Adult Education; How to Promote it. Prize Essay, by Wm. John Bullock, M.R.C.P.	The Author.
The Past, Present, and Future of British Agriculture, by Mr. Alderman Mechi	The Author.
Lighthouse Management; the Report of the Royal Commissioners on Lights, Buoys, and Beacons, 1861, Examined and Refuted by an Englishman	The Author.
Healthy Dwellings, and Prevailing Sanitary Defects in the Houses of the Working Classes, by Henry Roberts, F.S.A.	The Author.
Two Reports on the Movement for Improving the Dwellings of the Labouring Classes, made to the National Association for the Advancement of Social Science, by Henry Roberts, F.S.A.	The Author.
Notes on Art, British Sculptors, Sculpture and our Public Monuments	The Author.
Copies of the Fourth Report of the Commissioners for the Exhibition of 1851	Commissioners.
Lectures delivered before the Young Men's Christian Association, 1861.	Association.
The Cuneiform Inscriptions of Western Asia, Vol. I.	British Museum.
Report of the Commissioners on the Introduction of equal Weights and Measures into the Federal States, to the Diet	Dr. Steinbeis.
Catalogue of the Exhibition of Rottweil	,,
Health and Disease, as Influenced by the Daily, Seasonal, and Cyclical Changes in the Human System,	

Presents.	Donors.
by Edward Smith, M.D., L.L.B., F.R.S.	The Author.
Sulla Istruzione Primaria ed Industriale della Francia dell'Inghilterra e del Belgio, note Di Dino Carina	The Author.
Memoirs of the Geological Survey of India, Vol. II., Part 2	Geological Survey Office.
Annual Report of the Geological Survey of India and of the Museum of Geology, 1859–60	
Introduction to and Vol. I. of the "Dictionnaire de Chimie Industrielle, par MM. Barreswil et Aimé Girard."	The Authors.
Guide to the Art of Illuminating and Missal Painting, by W. and G. Audley	The Authors.
A Notice of the Origin, Progress, and Present Condition of the Academy of Natural Sciences of Philadelphia, by W. S. W. Ruschenberger, M.D.	The Academy.
Proceedings of the Academy of Natural Sciences of Philadelphia ...	,,
Report of the 18th Exhibition of the Ohio Mechanics' Institute, held in Cincinati, 1860	Ohio Mechanics' Institute.
Proceedings of the American Philosophical Society, No. 63	The Society.
Laws, Charter, and List of Members of	,,
Transactions of. Vol. XI., New Series, Part 3	,,
Memoirs of the American Academy of Arts and Sciences. Vol. VII., New Series	The Academy.
Transactions of the New York State Agricultural Society, 1858	The Society.
On the Alloys of Copper and Zinc, by Frank H. Storer	The Author.
Smithsonian Contributions to Knowledge, Vol. XI.	The Institution.
Report of the Superintendent of the United States' Coast Survey for 1858	Survey Office.
Notes on Nursing, by Florence Nightingale	E. Chadwick, Esq., C.B.
Quarterly Journal of the National Life-boat Institution. Vol. IV., No. 40–2	The Institution.
Address delivered at the Anniversary Meeting of the Geological Society of London, by Leonard Horner, F.R.S.	The Author.
Quarterly Journal of the Geological Society, Vol. XVII., No. 1–4	The Society.
University College Calendar, 1861–62	The College.
Pharmaceutical Journal, 2nd Series, Vol. II., 6–12, Vol. III., 1	Pharmaceutical Society.
Journal of the Royal United Service Institution, Vol. IV., No. 15, Vol. V., Nos. 16, 17, 18	The Institution.
Proceedings of the Literary and Philosophical Society of Liverpool (1860–61), No. 15	The Society.
Presse Scientifique des Deux Mondes; Revue Universelle du Mouvement des Sciences pures et appliquées, Vols. I., II., III.	
Proceedings of the Royal Geographical Society, Vol. V., No. 1–4	The Society.
Journal of Proceedings of Linnæan Society, Vol. V., Nos. 18–20, Vol. VI., No. 21, and Supplemental Botany, Vol. V., No. 20	,,
Quarterly Journal of the Statistical Society, Vol. XXIII., Part 4, Vol. XXIV., Parts 1, 2, 3	,,
Proceedings of the Royal Society, Vol. X., No. 41, Vol. XI., Nos. 42–46	,,
Quarterly Journal of the Chemical Society, Vol. XIII., No. 4, Vol. XIV., Nos. 1–2, Vol. XV., No. 3	,,
Horological Journal, from No. 28–40.	Horological Institute.
Canadian Naturalist and Geologist, Vol. VI., No. 1–5	Montreal Natural History Co.
American Journal of Science and Art, Nos. 90–95	B. Silliman.
Journal of the Royal Agricultural Society, Vol. XXI. No. 2, Vol. XXII. No. 1	Society.
Papers read at the Royal Institute of British Architects, 1860–61	Institute.
Journal of the Royal Asiatic Society, Vol. XVIII., No. 2, Vol. XIX., No. 1	Society.
Proceedings of the Institution of Mechanical Engineers for 1861	Institution.
Proceedings of the Zoological Society, Part 3 (1860), Part 1 (1861)	Society.
Canadian Journal of Industry, Science, and Art, Nos. 29–35	Canadian Institute.

CONTRIBUTIONS TO THE READING-ROOM.

The Council beg to acknowledge, with thanks to the proprietors, the regular receipt of the following journals and periodicals:—

WEEKLY.

Agricultural Review.
Athenæum.
Atlas.
Builder.
Building News.
Chemical News.
Cosmos.
Critic.
Engineer.
Engineers' Journal (Calcutta).
Gardeners' Chronicle.
London Review.
Mechanics' Magazine.
Mining Journal.
North British Agriculturist.
Photographic News.

FORTNIGHTLY.

British Journal of Photography.
Cotton Supply Reporter.
Canadian News.

MONTHLY.

Artizan.
Bulletin de la Société d'Encouragement pour l'Industrie Nationale.
Bulletin du Musée de l'Industrie.
Civil Engineer and Architects' Journal.
Comptes Rendus hebdomodaires des Séances de l'Academie de Sciences, Par M.M. Les Secrétaires Perpetuels.
Geologist.
Journal of the Franklin Institute.
Journal of the Horticultural Society.
La Science Industrielle.
Newton's London Journal of the Arts and Sciences.
Pract. Mechanics' Journal.
Repertory of Patent Inventions.

INDEX TO VOLUME IX.

* *disc.*, discussion at a meeting.

ERRATA.

Page 14, col 2, near the bottom, for "To Mr. J. C. Morton . . . the Society's Medal," read "To Mr. J. C. Morton . . . the Society's *Silver* Medal."

,, 48, col. 2, line 29, for "railway audits," read "rent-day audits;" and page 49, col. 2, line 17, for "maximum," read "minimum."

,, 110, col. 1, line 31, for "progressive," read "aggressive."

,, 147, col. 2, line 5, before "the malt tax," insert "the repeal of."

,, 202, col. 2, line 37, for "nominal," read "normal."

Page 528, col. 1, line 38, for "October, 1849," read "March, 1850."

,, 567, col. 1, lines 56 and 57, for "Mr. Adams (Secretary of the Shrewsbury Local Board)," read "Mr. Edwin Adams (Secretary of the Chelmsford Local Board)."

,, 599, col. 2, line 47, for "Westow" read "Wistow;" and page 600, col. 1, lines 20, 22, and 26, for "mask," read "wash."

,, 673, col. 1, line 15 from bottom, for "South," read "Western."

,, 791, col. 1, line 19, for "(who was Secretary to the Royal Society)," read "(who became subsequently a member and Foreign Secretary of the Royal Society.)"

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